



**IDENTIFYING KNOWLEDGE, SKILL, AND ABILITY REQUIREMENTS FOR  
33S OFFICERS IN DEPLOYED ENVIRONMENTS**

**THESIS**

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AFIT/GIR/ENV/07-M16

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FOR 33S OFFICERS IN DEPLOYED ENVIRONMENTS

THESIS

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**AFIT/GIR/ENV/07-M16**  
**Abstract**

Military operations in the past, present, and future are highly dependent on the timely distribution of accurate information; the only thing really changing is the speed and means of which it is dispersed. As we proceed forward in the information age, technology and the men and women responsible for it will play an ever increasing role in getting the right information in the right place at the right time. As the United States Air Force continues to transform into an ever increasing expeditionary service the knowledge, skills, and abilities of Air Force officers must transform as well to meet the evolving needs of combatant commanders. 33S officers perform garrison duties in many different capacities; current duty position or past experience thus does not guarantee we have acquired the knowledge, skills and abilities necessary to succeed when and where it matters most. Hence, the purpose of this research is to identify core skill sets in the form of knowledge, skills, and abilities, which are most important to Communication and Information (AFSC 33S) Officers to successfully carry out assigned duties in forward operating locations.

*Dedicated to my beautiful wife and five wonderful children; it is because  
of you I have succeeded where without your love, support, and inspiration*

*I would have otherwise failed.*

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Douglas M. Simmers

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IDENTIFYING TECHNICAL KNOWLEDGE, SKILL, AND ABILITY  
REQUIREMENTS FOR 33S OFFICERS IN DEPLOYED ENVIRONMENTS

**I. Introduction**

The end of the Cold War ushered in a dramatic change in global security. In response the United States reacted with radical changes in our own national security policy. The global security environment today requires the U.S. military be capable of responding rapidly to events anywhere in the world on a moments notice. The United States Air Force has responded to changes in national security policy by transitioning into a much more mobile, responsive, and flexible organization under what is called the Expeditionary Air Force (EAF) concept. The driving force behind the EAF concept is the Air Expeditionary Forces (AEF). The AEFs provide a wide variety of autonomous military capabilities to theater commanders for rapid response anytime, anywhere in the world. AEFs are dependent on preparedness to achieve success; of utmost importance is our ability to organize, train, and equip forces effectively and efficiently to facilitate rapid response when and where the need arises.

Organizing, training, and equipping forces form the foundation of the AEF concept. Like any three legged structure a deficiency in any one supporting element will cause the entire structure to fail. The most well equipped and trained military in the world is incapable of victory if disorganized to the point of ineptitude. Likewise, a well organized, well trained unit is doomed to fail if ill-equipped for the task at hand. Finally, a well organized, well equipped unit has little, if any, chance of success without a properly trained work force.

This study focuses on one of the three pillars I've mentioned: training. Adequate preparation is critical to success in deployed environments. Tours of duty are relatively short in deployed locations, normally around 120 days; overlap time with in-place personnel is limited or nonexistent therefore on-the-job training (OJT) is limited or nonexistent. With the vast areas of responsibility encompassing the communications and information career field it's imperative in today's expeditionary environment that Communications and Information Systems (33S) officers arrive in deployed locations with the skills necessary to succeed.

### **Purpose of this Study**

The purpose of this study is to identify a core set of technical skills required by Communications and Information Systems officers to successfully complete their mission in a deployed location. In addition, this study seeks to identify a level of technical self efficacy among communications officers prior to their arrival in a deployed location; in other words how well does the 33S community feel prepared technically for deployment? Finally, this study intends to identify how important 33S officers perceive technical skill sets to be in a deployed environment.

Previous studies conducted by Schmidt (1997), Phillips (1998), and Little (1999) attempted to identify important skill areas and training adequacies of communications and information officers. Schmidt (1997) found through a survey administered to company grade officers in the C&I career field that interpersonal skills were most important to 33S officers followed by managerial skills then technical skills. Phillips (1998), confirmed the findings of Schmidt; Phillips addressed the training adequacy through commander's perspective and found commanders also felt interpersonal skills

were most important to C&I officers followed by managerial skills and technical skills. Schmidt's and Phillip's works identified what skills were important to C&I professionals while Little (1999) attempted expand on previous research by identifying where training deficiencies existed. Little found that only about half of the C&I officers found their training to be satisfactory or better while 48% rated their training marginal or unsatisfactory. Additionally, Phillips found that commanders typically felt the skills most lacking by officers in their organizations was in the area of technical skills.

Over the last two decades the role of Communications and Information officers has expanded dramatically throughout the Air Force and DoD. The extreme diversity of the career field results in significant variations in required knowledge, skills and abilities (KSAs) depending on duty position. The crux of this problem is amplified in a deployed environment where the opportunity for training and skill development is greatly inhibited due to the temporary nature of the assignment, operations tempo, and the high turnover rate of the duty positions. This study will be unique from previous works in that it attempts to specifically identify technical knowledge, skills, and abilities required of C & I officers explicitly in the context of a forward operating environment.

### **Technical Knowledge, Skills, and Abilities Defined**

Nowhere in Air Force literature is the term “technical” skills explicitly defined. Career Field Education and Training Plans are riddled with the term, AFI 33-2923 requires we complete “technical” school before wearing the career field heraldry badge, and the Air Force Communications Agency (AFCA) has been charged with the administration of The Officer Technical Refresh program to fill existing gaps in “technical” skills. Perhaps there is no need for the Air Force to specifically define

technical skills, or possibly there is no single definition adequate to fully encompass all that the term entails. With that said, the nature of this study requires a clear definition of the term “technical” to differentiate the skill sets to be obtained in this study from the skill sets required by officers as a whole. In the absence of a formal Air Force definition, the author defaults to the Merriam-Webster definition:

**Technical - 1** **a :** having special and usually practical knowledge especially of a mechanical or scientific subject **b :** marked by or characteristic of specialization

With respect to the Communications and Information career field definition

**b:** above meets the author’s intent therefore “technical” will be defined as special knowledge, skills and/or abilities required to manage, operate, and/or maintain voice/data/video networks, mission systems, multi media operations, information management operations, or communications planning and implementation.

### **Research Questions**

My focus in conducting this research is on the training aspect of the organize/train/equip triad, specifically the technical knowledge, skills and abilities required of C&I officers to support the AEF concept. A series of questions will serve as my guide in conducting this research:

**Research Question 1** – Are C&I officers technically prepared for deployments in forward operating locations?

**Research Question 2** – To what extent are technical knowledge, skills, and abilities necessary for C&I officers to succeed in a deployed environment?

**Research Question 3** – What technical knowledge, skills, and abilities are most important in succeeding as a C&I officer in a deployed environment?

### **Scope of Research**

The scope of this research is to expressly obtain the opinions of 33S officers with current or previous deployed experience under the Expeditionary Air Force concept. Respondents to the survey are limited to 33S officers who've met this criterion. There is no rank, time-in-grade, or time-in service restrictions involved with the administration of this survey. The intention of this study is to gather insight provided by experience regardless of rank and/or years of experience; also, capturing data across the rank/experience spectrum can potentially prove to be useful by identifying varying requirements dependent on rank/position.

### **Assumptions**

Preparedness is critical to success in today's global security environment. A key element in preparedness is having the proper skills sets to meet the mission. It is well documented through previous research that interpersonal and managerial skills are critically important throughout the Air Force and not unique to any specific career field. This study makes the assumption that the importance of interpersonal and managerial skills remain constant overtime and are unaffected by changes in national security policy or the EAF construct therefore this study will not address these skill sets. However, it is recognized these skills are addressed through professional military education and commissioning sources and this study will assume all officers have had a minimum level of managerial and interpersonal training commensurate with the first level of officer professional military education (i.e. Air and Space Basic Course).

The Executive Officer duty position is recognized as part of the 33S career field; however, any officer AFSC can perform executive officer duties. The author will make the assumption there are no technical skills required by this duty position that are specific to the communications and information career field and therefore executive officer skill sets are not specifically addressed in the technical knowledge, skills, and abilities assessment.

The survey instrument used in this study is based largely on technical tasks contained within several communications related Department of the Air Force Career Field Education and Training Plans (CFETP); therefore, it is assumed all the technical knowledge, skills, and abilities represented in the survey are relevant to the communications and information systems career field.

### **Limitations**

This study attempts to capture the feelings and perceptions of previously deployed 33S officers as it relates to technical competence in a deployed environment. It is intended to provide the Air Force with a snapshot of technical training adequacy as it relates to preparedness in the EAF construct. This study is not intended to evaluate the quality, efficacy, or availability of 33S training programs or courses. Neither has any attempt been made to address improvements in training over time as no longitudinal data is available from previous research.

The technical knowledge, skills, and abilities drawn from the CFETPs to be represented in the survey were chosen largely based on the author's experience in the career field therefore it is entirely possible, or more likely probable, one or several pertinent skills may have been overlooked in the makeup of this survey. However,

provisions have been made within the survey instrument to gather additional data not specifically asked for.

## **Significance of Research**

The information found in this study is intended to provide the Air Force with a snapshot of how well communications and information systems officers are technically prepared for deployment. The findings may prove to be significant in tailoring training programs to meet the needs of today's expeditionary Air Force.

## **Thesis Overview**

This thesis is composed of five chapters: Chapter 1 provided a brief introduction to the study. It outlined limited background information pertinent to the problem addressed by the study. It also defined the scope of the study and addresses the significance of the study as it relates to the 33S career field. This chapter also identified a series of guiding questions used to keep focused on the study's purpose and provided assumptions and limitations recognized by the author.

Chapter 2 provides background information through an extensive literature review. The literature review attempts to explain the nature of the problem in a historical context by exploring how the evolution of national security policy has shaped our operating environment. It also summarizes how the Air Force has transformed to meet the demands of today's global security requirements while striving to maintain a competitive advantage. Finally, this chapter reviews the current taxonomy used to train 33S officers for duty within the Expeditionary Air Force construct. This is done through a review of current training opportunities for 33S officers made available from various resources throughout the Air Force.

Chapter 3, discusses in detail the methodology used for data collection, analysis, and interpretation. Techniques and methods used for validating the studies results will also be presented.

Chapter 4 presents data analysis derived from the application of the chosen methodology. A detailed presentation of the survey results will be presented in an aggregate descriptive form and some inferences will be made through statistical analysis in an attempt to adequately answer the guiding research questions in chapter one.

Finally, Chapter 5 provides a discussion of findings, presents conclusions to the guiding research questions, and recommends future research opportunities.

## **II. Literature Review**

### **Evolution of National Security Policy**

The destruction of the Berlin Wall in 1989 unifying Germany symbolized the end of the Cold War. The subsequent collapse of the Soviet Union in which former Soviet republics declared their independence from provided the United States with further evidence that support for communism had diminished throughout Europe and the Eastern block countries. Furthermore, it is widely accepted by political and military experts that the collapse of the Soviet Union ended any real threat of global nuclear war between superpowers (Woolf, 2006). In the course of a few years, the global environment had changed from a world in which two predominant superpowers confronted each other to a world in which only the United States remained supreme. While the presence of global nuclear war has greatly diminished, it has been replaced by a host of regional and ethnic conflicts. Nowak (1999) summed up the predictability of the Cold War era in his 1999 study where he stated:

“The Cold War era of 1946 to 1991 was actually one of relative calm.

During this period, nations found themselves divided into three basic camps: those countries aligned with the “free world” ideals of the United States, those aligned with the Soviet Union and its concept of world socialism, and a smattering of non-aligned countries who attempted to walk the tightrope between the two super powers. Within this framework of ideologies, nations conducted international trade while the United

States and Soviet Union jockeyed for hegemony over their respective spheres of influence. “

Our national security policy of containment, first drafted during the Truman administration and preserved largely intact through the Clinton administration, served the country well for over half a century. During the Cold War, Americans faced the prospect of instantaneous annihilation from a well known and well understood threat. The events of September 11, 2001 on American soil confirmed a new threat has fully emerged, one in which smaller but extremely damaging and unpredictable attacks, can occur anywhere, anytime with little or no warning.

Contrary to predictions that the end of the Cold War would lead to a more stable international political landscape, the end of the Cold War has produced much the opposite. What remains in the wake of the Cold War are many regional areas of instability characterized by fractured governments with social and economic unrest. The end of the Cold War complicated world events to an unpredicted degree for U.S security and foreign policy. Despite the terror of global nuclear war diminished, without an adversary capable of directly threatening the security of the United States we continue to struggle as a nation to find an adequate national security policy addressing the new landscape; complicating the matter further, is attempting to define exactly what role the military plays in such a policy. (Nowak, 1999)

With the events of September 11, 2001 the United States entered a noticeably changed security environment. In the aftermath President George W. Bush set in motion the stage for a radical redesign of national security policy. The Bush administration cast

aside the principles of containment policy which characterized the Cold War era in search for policy to restore security to a world that seemed suddenly more dangerous than ever. The invasion of Afghanistan in pursuit of Osama Bin Laden and subsequent overthrow of the Taliban regime signaled the beginning of radical change in U.S. national security policy (Tinsley, 2005). Following the invasion of Afghanistan President Bush announced the foundation of our new national security policy in a speech given at West Point on June 1, 2002 and again to the United Nations General Assembly in September 2002. In these two addresses President Bush clearly and succinctly sums up the crux of the administrations new policy in three sentences: “We will defend the peace against the threats from terrorist and tyrants. We will preserve the peace by building good relations among the great powers. And we will extend the peace by encouraging free and open societies on every continent” (Tinsley, 2005). The new policy, focused on global engagement, has and will continue to have a dramatic affect on military operations for the foreseeable future.

### **Impact of National Security Policy on Military Operations**

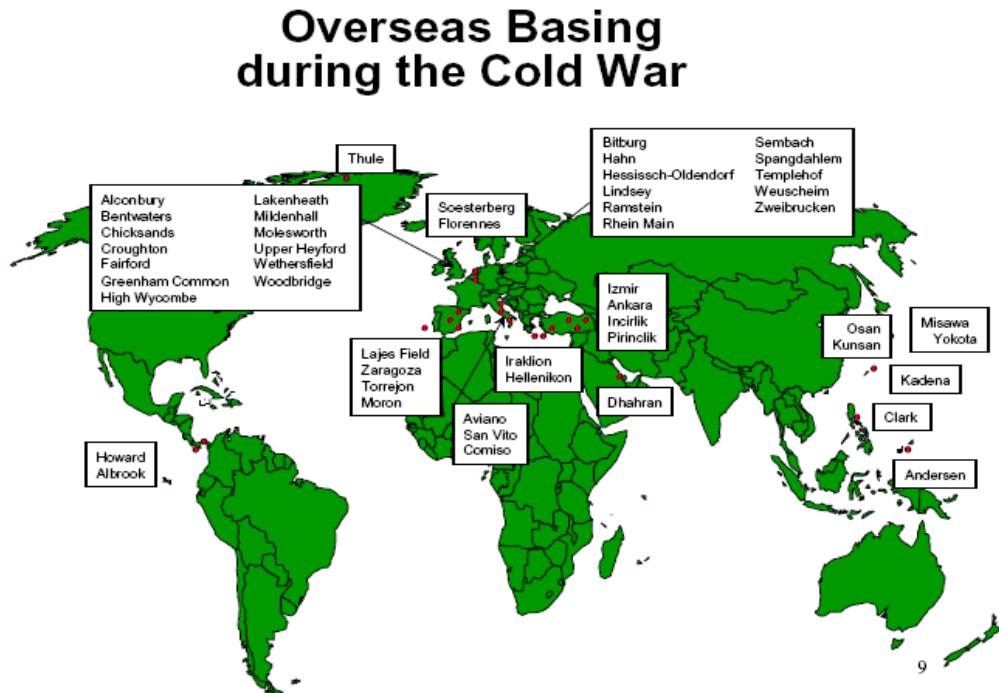
*I have heard the lament that, “the Air Force is not what it used to be during the Cold War,” and I must tell you that it is absolutely true; this “ain’t” our fathers’ Air Force. As the world around us changes, so must all the services, including the Air Force.*

— General Michael E. Ryan

As the only remaining superpower following the Cold War foreign and domestic pressure began to mount to reduce our military force; foreign countries no longer saw need for U.S military presence on their soil and the American people historically have a

disdain for financing a large military in times of peace. (Fisher, 1997) As a result, the U.S. began a systematic process of reducing manning and eliminating overseas bases.

**Figure.2-1** USAF Overseas Basing During the Cold War (Davis, 2003)



Air Force manning and our permanent presence overseas plummeted during the 1990s and into the 21<sup>st</sup> century, however, operations overseas continued on at various levels of scope and intensity.

**Figure 2-2 USAF Overseas Basing Post Cold War (Davis 2003)**

## Overseas Bases in the late 1990s



Military intervention around the world the past decade has ranged in size and purpose from high intensity operations to low intensity humanitarian relief operations. By virtue of being the only remaining superpower it is a virtual lock the United States will remain engaged as a major player in the global environment through the foreseeable future including at least the first half of the 21st century (Travnick, 2000). A RAND Corporation study goes on to say:

“...‘military operations other than war’ (MOOTW)...– lesser conflicts, punitive raids and expeditions, peacekeeping, humanitarian operations, and so forth – seem likely to remain a frequent feature of the world scene through the first part of the 21st century...Humanitarian assistance will remain a U.S. vocation...We do not see the demand for such aid decreasing over the years to come. Indeed, it seems to us likely that the number and severity of humanitarian crises will increase over the next 30

years...the U.S. military will remain the organization best equipped to respond to this menu of challenges" (Khalilzad,2003)

The last decade has been challenging to senior Air Force leaders in meeting demands placed on troops and equipment. Our nation's security strategy still dictated that the Department of Defense be ready to fight and win two concurrent major theater wars, while simultaneously remaining committed to an ever increasing series of small scale contingencies. Despite the fact the Air Force lost two thirds of its permanent bases in Europe and the Mediterranean during the 1990's due to fiscal constraints the global security environment in the early part of the 21<sup>st</sup> century dictates now more than ever the Air Force have the flexibility and capability to respond rapidly and effectively to crises anywhere in the world.

Speed and flexibility have long been tenets of war but not always complimentary objectives. During the World War 1 era combat was characterized by large masses of ground combat forces engaging on the battlefield. The tenet of speed in these situations was achieved through strict adherence to very large and detailed battle plans; to deviate from the predetermined amassing of forces was to jeopardize the entire operation. The Air Force's first attempt at implementing a rapid flexible response force was facilitated by the organizations poor response to the outbreak of the Korean War; although the first USAF combat sorties were actually flown within 24 hours of the U.S. government's decision to come to the aid of South Korea the best trained and equipped personnel from Strategic Air Command did not enter the conflict until seven weeks after hostilities began (Davis, 2003).

Early attempts to meet the operational needs of a post Cold War environment have met with limited success. One such attempt was spearheaded by former Air Force Chief of Staff General Merril A. McPeak. General McPeak lead the Air Force through a radical reorganization in the early 1990's known as the "composite wing." The composite wing concept created combat units with all the assets needed to execute highly complex combat tasks autonomously. All the assets were trained, operated, and maintained at one base under the control of a single commander; this aspect of the composite wing became known as one base/one wing/one boss solution (Bussiere, 2001). General McPeak surmised the primary advantage of a composite wing would be its potential for reducing the amount of higher-headquarters guidance and up-channel reporting needed to prosecute daily combat operations. General McPeak cited other distinct benefits including: 1) increased capability for independent action if the air tasking link is interrupted; 2) enhanced ability to train in peacetime for expected combat contingencies 3) reduced vulnerabilities resulting from the dispersal of critical assets; 4) less pre-hostilities unit shuffling, i.e. taking one squadron from Base A and two squadrons from Base B to form a combat unit and 5) consolidated command responsibility in one individual, the wing commander (McPeak, 1990).

Proponents of the new structure hailed it as revolutionary and futuristic while detractors insisted it was neither. History indeed shows that composite air organizations in one form or another have existed as early as 1911 when the Signal Corps consolidated two Wright Type-B and two Curtiss IV Model-D airplanes at Fort Sam Houston, Texas, to explore their potential use in military applications (Moschagat, 1993). Composite units, though rare have existed throughout the 20<sup>th</sup> century. Composite units were used post

WWI to defend coastal areas of Hawaii and sustained themselves through the end of WWII when the 509<sup>th</sup> Composite Group was used to drop atomic bombs on Hiroshima and Nagasaki. Later in the 1950's Tactical Air Command (TAC) formed the Composite Air Strike Force (CASF) which has been widely regarded as a precursor to General McPeak's composite wing concept. Although no longer labeled as composite wings defacto composite organizations still exist in today's Air Force (Moschgat, 1993).

Unquestionably the composite wing concept has many positive attributes. They are flexible, responsive, and well suited for independent operations. With that said it still did not meet the demands of post Cold War environment in which uncertainty is the norm and quick response and flexibility are critical to achieving success on the battlefield. Former USAF Chief of Staff General John Jumper stated that while composite wings offered excellent training and operational opportunities for dissimilar aircraft, "it turned out to be ungainly in its execution. In the day-to-day training, it was marvelous to have all of those assets together, but it was offset by the ponderous way it got off the ground" (Tirpak, 1997).

With composite wings proving not to be the answer, in order to meet the global military demands of the 21<sup>st</sup> century the Air Force has transitioned in to a more mobile organization under what is known as the Expeditionary Air Force construct, or EAF. The EAF concept would later come to be known as the Air and Space Expeditionary Force concept as the Air Force continues to incorporate space into its core competencies. According to Air Force Instruction (AFI) 10-400, *Aerospace Expeditionary Force Planning*, "The EAF concept is how the Air Force will organize, train, equip, deploy and sustain itself by creating a mindset and cultural state that embraces the unique

characteristics of aerospace power—range, speed, flexibility, precision—to meet the national security challenges of the 21st Century. Former Secretary of the Air Force F. Whitten Peters described the new EAF as “...not just one event. It is a completely different way of looking at how we do our business. It is also a fundamental change in the way we operate.... We are moving into the EAF for two reasons. First, to make sure that the nation has the trained aerospace forces it needs. Second, to make sure that our people have relief from operations tempo, or OPTEMPO, in a turbulent world.”

The origins of the EAF concept surfaced in October 1994, when Iraqi forces under the control of dictator Saddam Hussein appeared to again be preparing for the invasion of neighboring Kuwait. The United States had previously redeployed the vast majority of its Operation Desert Storm assets back to its garrison locations and hence was forced to rapidly return to the Persian Gulf with enough equipment and manpower to prevent a reoccurrence of Iraq's 1990 invasion of the very small but strategically important Arab state. The subsequent redeployment of forces on short notice proved to be a major challenge for the Air Force. The answer was to create the Expeditionary Aerospace Force, a new way of doing business that provided the Air Force with a potent administrative tool to more proficiently align its resources with the needs of theater commanders (Tirpak, 1997). EAF is a massive step forward from organizational structures of the past but its foundation remains firmly planted in Air Force core competencies of: air and space superiority, global attack, rapid global mobility, precision engagement, information superiority, and agile combat support (Fisher, 1997).

At the core of the Expeditionary Air Force is the Air Expeditionary Forces -- the AEFs. Under the AEF concept almost all of the Air Force – active, Reserve and Guard --

are divided into 10 equal fighting forces. The 10 AEFs are sourced by utilizing the pre-existing USAF War and Mobilization Plan (WMP) structure which identifies existing USAF capabilities. Unique capabilities are listed in the WMP, Volume 3, Part 3 and are uniquely identified by a 5 digit alpha-numeric Unit Type Code (UTC) designator. The UTC contains three critical pieces of information: a mission capability statement which describes the unique capability the UTC is intended to provide, manpower requirements identified by AFSC, rank and skill levels required to perform the capability, and an equipment listing identifying equipment needed to fulfill the capability. Table 2-1 shows information typically found in a UTC Mission Capability Statement.

**Table 2-1** UTC Mission Capability Statement and Manpower Detail Example

**UTC:** 6KNSC **Title:** COMM NETWORK OPS & SECURITY CTR

**UNCLASSIFIED Mission Capability Statement:** AUGMENTS UTC 6KNS1 TO EXPAND AFFOR NOSC-D SERVICES. INCLUDES EXPERIENCED NOSC CREW COMMANDER, ENTERPRISE CONTROLLERS, ENTERPRISE DEFENDERS, AND NOSC HELP DESK FOR ONE SHIFT AT AFFOR NOSC-D.

**MANPOWER DETAIL** Authorized Total: 8 (Officers: 1 Enlisted: 7 Civilians:  
0 Contractors: 0 Other: 0 )

<u>POSITION TITLE</u>	<u>AFSC</u>	<u>SEI</u>	<u>GRADE</u>	<u>QTY</u>	<u>LINE NUMBER</u>
COMM & INFORMATION	033S3		03	1	001
COM/COMPTR OPS JNMN	3C051			4	002
COM/COMPTR OPS CFMN	3C071			1	003
COM/CMPTR SYS-C JNMN	3C251			1	004
COM/CMPTR SY-C CFMN	3C271			1	005

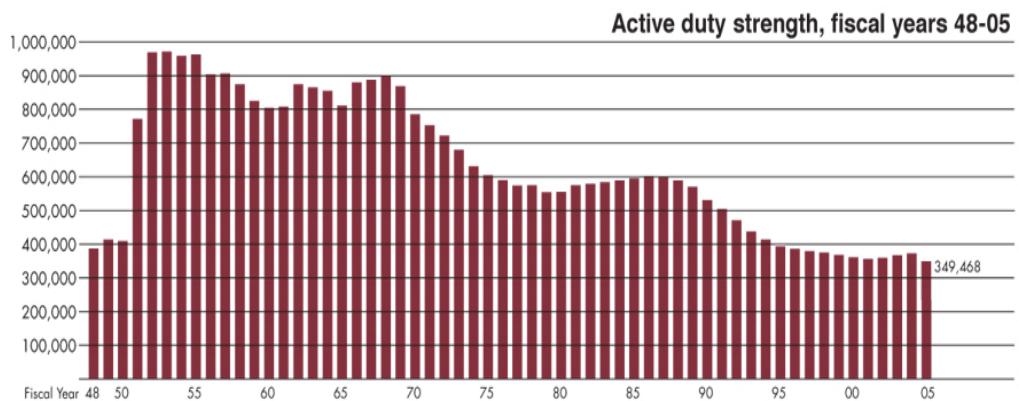
The WMP, Vol 3, Part 3 lists all USAF UTCs currently approved and available to theater commanders for operational planning and execution. The 10 AEFs are sourced as equally as possible with a cross-section of UTCs from across the Air Force. Each AEF package is designed to provide theater commanders with a full spectrum of Air Force capabilities to respond within 72 hours of any unexpected contingency anywhere in the world. The components are trained, equipped and capable of being tailored to meet commanders' needs (AFI 10-403).

AEFs were initially paired in packages of two with the first pair standing up Oct. 1, 1999 for a period of three months followed by twelve months on home station resulting in a 15 month recurring cycle of deploy/reconstitute. The AEF force structure was severely tested following the 9/11 attacks on U.S. soil. The height of simultaneous deployments supporting the Global War on Terrorism, Enduring Freedom, Iraqi Freedom and Noble Eagle occurred in 2003. During this period nearly twice as many Airman deployed during 2003 as during Operation Desert Storm in 1991. To meet the rising demands of air and space power worldwide, the Air Force was forced to expand the AEF Cycle from a 90-day, 15-month cycle to a 120-day, 20-month cycle, beginning Sept. 1, 2004 (USAF Fact Sheet, 2006).

### **Communication & Information Transformation**

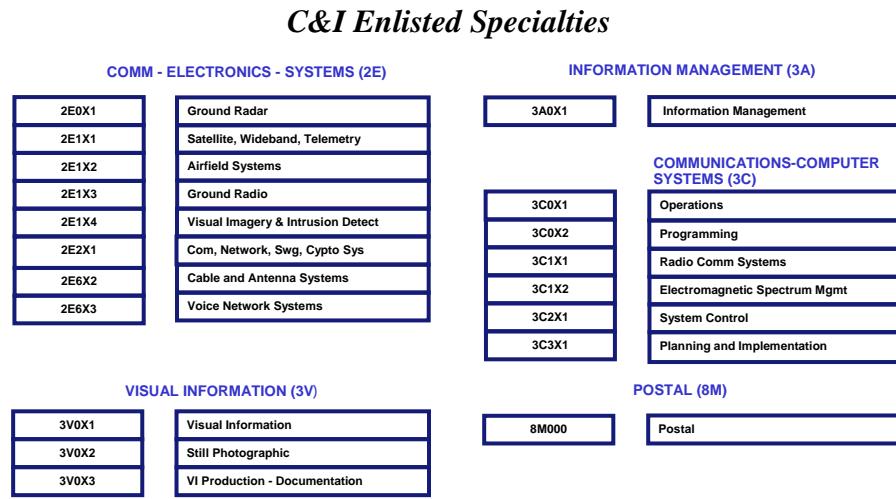
Why must organizations transform? The answer in its simplest form comes down to two distinct factors: competitive advantage and economics. The Air Force describes transformation as “A process by which the military achieves and maintains an advantage through changes in operational concepts, organization, and/or technologies...” (USAF Transformation Flight Plan, 2004) while economics studies human behavior in the context of allocating scarce resources. Not surprisingly, gaining and subsequently maintaining competitive advantage in combat, as with any business venture, is a continuous process. Competitive advantage is a constant desire and achieved fundamentally through the effective allocation of resources. Allocating resources however, is highly dependent on the scarcity of the resource. Scarcity of human resource in the Air Force is as prevalent today as it has been at any time in its history; manning strengths are at the lowest levels in the history of the Air Force.

**Figure 2-3** Personnel Strength 1948-2005 (Source: Airman –The Book, Winter 2006)



Reductions in force continue to be forecasted well into the early part of the next decade and the Communications and Information career field are certainly not immune. In 2006 approximately 4,300 33S officers were assigned to the career field (Airman, 2006). That number is projected to be reduced by 46% over the next five years to roughly 2,350 by 2011. Today, C&I officers are responsible for roughly 35,000 enlisted personnel, belonging to five core Air Force Specialty Codes (AFSC) and 19 different technical specialties (Nelson, 2006). In addition, 33S officers are required to fill various positions on 49 different UTCs identified in the USAF WMP, Vol 3, Part 3.

**Figure 2-4** Enlisted Specialties Under 33S Scope (Source: SAF/XCID Brief)

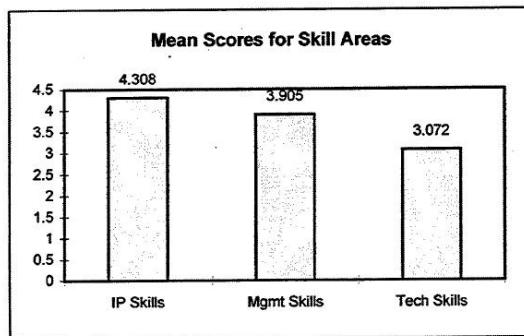


The extreme diversity of the 33S career field poses a significant challenge to get 33S officers in the right place, at the right time, with the right skill sets.

### Training 33S officers in the Expeditionary Air Force

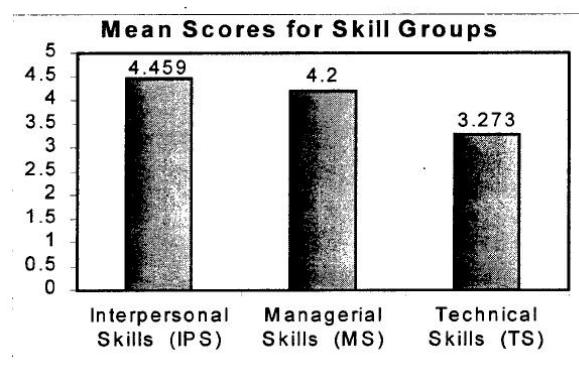
A previous study conducted by Schmidt (1997), found interpersonal skills most important to 33S officers followed by managerial skills then technical skills.

**Figure 2-5** Skill Set Importance as Rated by 33S CGOs (Schmidt, 1997)



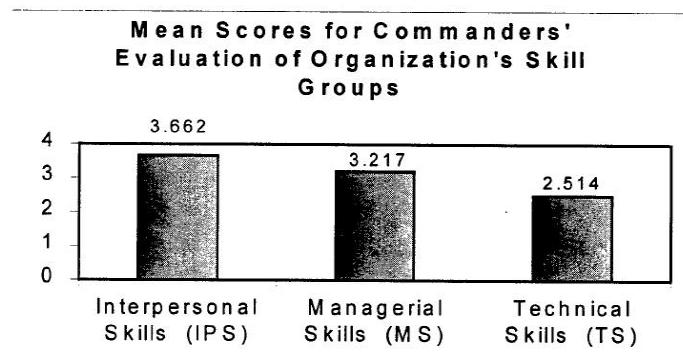
The graph in Fig 2-5 depicts the average scores attained from a five point Likert scale. The figures were compiled from a survey of administered to 242 33S company grade officers. Phillips (1998) expanded on Schmidt's research by administering a similar survey to 130 33S officers serving in designated commander duty positions. Phillips found commanders also felt interpersonal skills were most important, followed by managerial and technical skills.

**Figure 2-6** Skill Set Importance as Rated by 33S CCs (Schmidt, 1997)



In addition to confirming Schmidt's (1997) findings Phillips (1998) also identified commanders felt technical skills were the skill set most lacking in their organizations. Phillips' finding is not surprising; it can be inferred less importance would be placed on attaining technical skill sets given these skill sets were found to be of least importance.

**Figure 2-7** Commanders Evaluation of 33S Skill Sets within their Organization



The paradigm shift in national security policy to global engagement requires rapid, flexible response anywhere, anytime; this will no doubt place increased emphasis on preparedness. AEF missions will impose a variety of new demands. Thus, an overriding issue concerns the substantial risk that current training will leave the Air Force unprepared for future engagements (Fuchs, Vol 2, 1997). Developing technical expertise in networking and mission system operations will prove invaluable in preparing to serve in AFNOSC, MAJCOM NOSC, combined air operations center, Information Warfare Flight, support battle staff, or survivable recovery center (33s CFETP. Apr 2006).

To prepare officers for duty the career field has developed a 33S Career Field Education and Training Plan. This training plan serves as a roadmap for training C&I officers. In addition, the CFETP outlines training communications officers should receive to be effective and defines skills required to progress throughout their careers.

The first level of communications officer technical training has evolved over the last decade in response to Air Force transformation. Basic Communications Officer Training (BCOT) has transformed from an all inclusive 12 week, 9 block course of instruction to a series of shorter courses tailored to specific duty positions within the career field. The following is a summary of core technical training courses offered by Air Education and Training Command (AETC) currently available to C&I officers:

- Expeditionary Communications Officer Training (ECOT) - provides a baseline level of communications knowledge required for junior officers to function in the career field. All 33S officers are required to attend this course prior to being awarded the 33S skill progression designator. The course combines technical instruction with concepts of the Air Force's vision, and introduces officers to the role of communications in the Air

Force of today and tomorrow. In addition, the course provides an introduction to key roles in communications squadrons, deployed communications, networking, enterprise operations, information operations, executive officer duties, space operations and overall view of war fighting integration. Table 2-2 shows the blocks of curriculum and the time spent instructing each block to establish a baseline of knowledge for 33S officers.

**Table 2-2** ECOT Curriculum

Course	Overview/Description	Duration
Network Security Issues	Security issues surrounding computers and the Internet	210 Minutes
Telecommunications Essentials	Fundamentals of analog and digital telephony	8.5 Hours
Networking Concepts	Basic networking concepts and devices	175 Minutes
Fundamentals of Internetworking	Topologies, protocols, and strategies of networks	5 Hours
The Art of Knowledge Management	Big-picture information about knowledge-- where it comes from and how to keep it coming.	3.5 Hours
Strategic Planning and Positioning for IT Projects	New methods of strategic project planning to help you plan more effectively for your next IT project.	5 Hours
Strategic Management - Planning	The planning phase of strategic management, which includes defining company mission, performing internal analysis, and evaluating the external environment.	2.5 Hours
Introduction to Networking	The basic infrastructure of networks, including the client/server model and network protocols, and the fundamentals of Local Area Networks (LANs) and Wide Area Networks (WANs)	275 Minutes
LAN Topologies and Techniques	LAN topologies and access techniques	4 Hours
Network Security Overview	Fundamentals of security for defending your network	185 Minutes
Introduction to IT Project Management	Project management with a special focus on managing IT projects.	4 Hours

Components, Printers, Networks, and Functions of the motherboard, processors, 110 Minutes  
Safety and memory and to outline procedures for maintenance, printer functionality, and basic networking

Introduction to Communications Methods by which data is transferred 200 Minutes  
Methods and Equipment electronically from one device to another and the hardware used to achieve this

- Communications Officer Engineering Course - designed to further educate officers in various aspects of engineering relative to the career field. Topics in this course include engineering factors, communications link engineering and installation, and network engineering and analysis.

- Communications Officer Deployed & Tactical Communications Education Course - presents current and emerging communications programs, initiatives and technologies impacting the Department of Defense total force concept for the communications warriors in a deployed environment.

- Communications Officer Networking Training Course – provides the knowledge and skills necessary to operate Air Force networks at the base/ wing level. It presents current and emerging communications and information programs, initiatives and technologies impacting the Department of Defense total force concept for the communications manager in a fixed environment.

- Enterprise Network Operations – educates officers on roles, responsibilities, and authority of agencies involved in the Air Force enterprise to include information architecture, network operations and security, systems integration and capabilities, and survivability & risk management in the full spectrum of operations.

- Communications Officer Warfighting Integration Education Course – provides introduction to war fighting integration as it relates to command, control,

communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) platforms.

- Advanced Communications Officer Training Course (ACOT) - professional development school for intermediate-level C&I officers and civilian equivalents in the 33S career field. The course provides knowledge and skills necessary to perform duties of Communications and Information Officer at the field grade level. Instruction is provided in the areas of information operations, expeditionary warfare support, communications squadron issues, and reflections on senior leader perspectives (HQ AETC ETCA, 2007).

In addition to the core courses offered by AETC, the Air Force Communications Agency (AFCA) is charged with providing supplemental training through the Officer Technical Refresh (OTR) program. The program is designed to augment initial and advanced communications training and fill the existing training gaps. The program utilizes a regional training approach to minimize two major obstacles in obtaining training: time and money. The program funds commercially available training and brings it to regional sites with high concentrations of communications professionals. Courses range from one day to five days (33S CFETP, 2006). The following table lists courses currently available under the OTR program. Detailed descriptions of the below courses are available through AFCA.

**Table 2-3** Officer Technical Refresh Courses

Course Title	# of Days	Vender
650--Information Assurance, Roadmap to Excellence	4	AFCEA
351--Terrestrial and Wireless Networking and Trends	5	AFCEA
503--DoD Architecture Framework Implementation	5	AFCEA
504--Systems Engineering in a Net-Centric World	3	AFCEA

(Formerly Advances in DoD Architecture)		
601--From Data Mgt, Info Mgt, and Knowledge Mgt	3	AFCEA
261--Net-Centric Warfare: Interpretation, Technologies and Implementation  (Formerly Introduction to Net-Centric Warfare)	4	AFCEA
302--Military Satellite Communications in a Net-Centric Transitional Communications World (Does not Travel)	5	AFCEA
350--Wireless Systems and Networks  (Formerly Local and Cellular Wireless Networks)	3	AFCEA
281--Global Command and Control Net-Centric Family of Systems Leading to JC2	5	AFCEA
203--The U.S. Intelligence Community: Who Does What, With What, for What?	3	AFCEA
260--Data Mining Technologies and Their Applications to Counter-Terrorism	3	AFCEA
380--Covert Internet Communications	2	AFCEA
340--Automated High Frequency Radio	3	AFCEA
3760--Telecommunications Fundamentals  (Formerly Telecommunications Carrier Data Services)	4	GlobalKnowledge
9800--Network Security I: Policy, Administration, and Firewalls	3	GlobalKnowledge
9860--Network Security II: Integration and Implementation	2	GlobalKnowledge
3277--Voice over IP Foundations  (Formerly Implementing Voice Over IP)	5	GlobalKnowledge
3285--Advanced Deployment of Voice Over IP	4	GlobalKnowledge
9805--Essentials of Network Security	5	GlobalKnowledge
3606--Wireless Networking I: Integration and Implementation  (Formerly Integrating Wireless Networks)	5	GlobalKnowledge
3610--Wireless Networking II: Security and Analysis  (Formerly Securing Wireless Networks)	4	Learning Tree
9452--Network Mgt--Tools, Optimization, and Troubleshooting	4	GlobalKnowledge
9100--Migrating to IPv6	3	GlobalKnowledge
2819--IT Project Management	3	GlobalKnowledge
2839--IT Risk Management	4	GlobalKnowledge
2805--Business Skills for IT Professionals	2	GlobalKnowledge
9856--Information Security in the Federal Government	2	GlobalKnowledge
3681--Advanced Cellular Technologies  Formerly Next Generation Wireless Mobile Technology)	2	GlobalKnowledge
1730--Storage Technology Foundations	5	GlobalKnowledge
461--Voice Over IP	4	Learning Tree
378--Mobile Communications and Wireless Networks	4	Learning Tree
488--Deploying Internet and Intranet Firewalls	4	Learning Tree
589--Assessing Network Vulnerabilities	4	Learning Tree

536--Computer Forensics and Incident Response	4	Learning Tree
289--Disaster Recovery Planning	4	Learning Tree
241N--System and Network Security	4	Learning Tree
241R--Advances in Telecommunications	4	Learning Tree
371--Implementing and Troubleshooting Wi-Fi	5	Learning Tree
486--Implementing Web Security	4	Learning Tree
420--Securing wireless Networks: Hands-On	4	Learning Tree
468--Introduction to System and Network Security	4	Learning Tree
6515--Information Technology Project	3	American Mgt Assn
REQ111--Capabilities-Based Operational Requirements	3	AFIT

Several avenues exist for communications officers to further their knowledge of the career field. AFCA hosts a series of C&I seminars with a target audience of Air Force officers, senior NCOs and DAF civilians (GS-09 and above) that are performing duties or about to assume responsibility for the operation of base-level communications functions. Areas of instruction include: Information Management, Information Protection, Maintenance Management, Information Systems Management, Planning and Implementation Management, Project Planning. In addition, the opportunity for computer based learning exists through the Air Force IT E-Learning web interface. This interface provides numerous online courses to develop officer's technical knowledge, skills, and abilities.

## **Chapter Summary**

This chapter provided background information through an extensive literature to explain the nature of the problem in a historical context by exploring how the evolution of national security policy has shaped our operating environment. In addition, it has documented how the Air Force has transformed to meet the demands of today's global security requirements by evolving into a more rapid and responsive combat force through

the implementation of the AEF construct. This chapter also reviewed the impact of global engagement strategy on training and how the 33S career field has responded to that demand. And finally, a review of the current taxonomy used to train 33S officers for duty within the Expeditionary Air Force construct was included as well.

### **III. Methodology**

#### **Chapter Overview**

This chapter describes the methodology chosen to answer the guiding research questions posed in Chapter 1. Again, the purpose of this survey is to identify how important 33S officers feel technical skills are to succeeding in a deployed environment, how technically prepared they feel to deploy, and finally, identify what technical skill sets they feel are important to success in a deployed environment. Data gathered from a descriptive survey will be used to answer the guiding questions. This chapter provides a detailed explanation for the chosen methodology; relevancy of the population, data collection methods, survey development and testing, sample size, and survey administration.

#### **Choosing a Methodology**

Two overarching approaches to research methodology exist: qualitative and quantitative. To select an appropriate research methodology Leedy and Ormrod (2005) developed a framework of distinguishing characteristic of the two methodologies. This framework was applied to the guiding research questions to select an appropriate methodology. Leedy and Ormrod's (2005) framework is based on five general questions developed to assist the researcher in determining whether a qualitative, quantitative or mixed method research approach should be utilized.

**Table 3-1** Rationale for Selecting the Appropriate Research Methodology

<i>Question:</i> What is the purpose of the research?	<i>Quantitative:</i> <ul style="list-style-type: none"><li>• To explain and predict</li><li>• To confirm and validate</li><li>• To test theory</li><li>• Focused</li><li>• Known variables</li><li>• Established guidelines</li></ul>	<i>Qualitative:</i> <ul style="list-style-type: none"><li>• To describe and explain</li><li>• To explore and interpret</li><li>• To build theory</li><li>• Holistic</li><li>• Unknown variables</li><li>• Flexible guidelines</li></ul>
What is the nature of the research process?		

What are the data like and how are they collected?	<ul style="list-style-type: none"> <li>• Static design</li> <li>• Context-free</li> <li>• Detached view</li> <li>• Numeric data</li> <li>• Representative, large sample</li> <li>• Standardized instruments</li> </ul>	<ul style="list-style-type: none"> <li>• Emergent design</li> <li>• Context-bound</li> <li>• Personal view</li> <li>• Textual/Image based</li> <li>• Informative, small sample</li> <li>• Observations, interviews</li> <li>• Search for themes</li> <li>• Subjective</li> <li>• Inductive reasoning</li> <li>• Words</li> <li>• Narratives, individual quotes</li> <li>• Personal voice, literary style</li> </ul>
How are data analyzed	<ul style="list-style-type: none"> <li>• Statistical</li> <li>• Objective</li> <li>• Deductive reasoning</li> <li>• Numbers</li> <li>• Statistics, aggregated data</li> <li>• Formal voice, scientific style</li> </ul>	
How are findings communicated?		

(Leedy and Ormrod, 2005)

### **Question 1: What is the purpose of the research?**

Leedy and Ormrod (2005) pose three sub-questions to help answer this:

1. Is the research intended to explain and predict or to describe and explain?
2. Is the research intended to confirm and validate or to explore and interpret?
3. Does the research attempt to test theory or to build theory?

Quantitative research attempts to explain by testing existing or proposed theory, the qualitative research builds theory through exploration and interpretation of available data. This research attempts to explain and predict by gathering new data, validate findings through analysis, and challenge existing theory underlying technical skill utilization in deployed environments.

### **Question 2: What is the nature of the research process?**

Leedy and Ormrod's (2005) second question also contains a number of sub-questions:

1. Is the research focused or holistic?
2. Are the research variables known or unknown?
3. Are research guidelines established and rigid, or are they flexible?

4. Is the research design static or emergent?
5. Is the research process context free or context bound?
6. Does the research process employ a detached view or a personal view?

This research is a focused effort on specific skills of a specific population, the variables are well defined but limited in scope, research is contextually bound to a single career field in a specific environment, and the research process employs a detached objective view.

**Question 3: What are the data like and how are they collected?**

The third question concerns data collection methods. This study will examine somewhat large representative sample of the relevant population using a standardized survey instrument. The much of raw data gathered is not subject to interpretation but quantitative in nature, however, a portion of the survey instrument gives respondents the opportunity to provide feedback in an unstructured open ended question format. In addition, qualitative information is gathered using a Likert scale which will be coded numerically for quantitative analysis.

**Question 4: What is the form of reasoning used in analysis?**

The fourth question considered focuses on the form of reasoning or logic used in conducting the research. This study is based on objectivity and statistical analysis.

**Question 5: How are findings communicated?**

Leedy and Ormrod's (2005) final question explores how the researcher will communicate his or her research results. This research effort incorporates numbers, statistics and aggregated survey data. The findings will be communicated through

descriptive and inferential statistical analysis in chapter four as well as a qualitative evaluation of the findings in chapter five.

### **Appropriate Methodology**

The elements of the study when compared to the research characteristics identified by Leedy and Ormrod (2005) lean heavily towards quantitative methods. However, some aspects of the survey instrument suggest that using a qualitative approach is most appropriate. For this reason a mixed quantitative/qualitative methodology will be utilized in conducting this research.

### **Data Collection Method**

A survey instrument was chosen to collect data for this study. Conducting surveys typically involves specifying a target variable(s) of interest, identifying a relevant population displaying the variable of interest, deciding how best to gather the data and developing an appropriate instrument, collecting the data, and finally synthesizing the results in a comprehensive format (Thomas, 2003). Two primary reasons exist for choosing this method. First, Communications and Information Systems officers are dispersed across the globe. The career field transcends across the entire organizational structure of the Air Force and Department of Defense. A questionnaire survey was chosen due to time constraints and the ability to gather data effectively and efficiently across a large geographically separated population. Second, survey instruments are effective for measuring the current status of population's characteristics and also provide the ability to analyze, or possibly discover, relationships between variables of interest using statistical analysis (Graziano, 1999).

## **Target Variables of Interest**

The dependent variable, the variable subject to influence by independent variables, for this research is the technical preparedness of 33S officers for duty in deployed environments. Independent variables, those hypothesized to have an influence on the dependent variable, included in this research include rank, deployed experience, number of years as a 33S, type and amount of technical skills training received, and type of formal education received.

## **Relevant Population**

The study is designed to assess knowledge, skill, and ability requirements of 33S Communication and Information Systems officers performing duties in deployed environments; as such, the relevant population for this research is 33S officers with current or previous deployed experience. The relevant population was extended to include all 33S officers in any rank with any number of years experience in the 33S career field who have served in deployed environments a minimum of one time. A sample made up of various ranks and years of experience is appropriate for the following reasons: 1) It is likely core technical knowledge, skill, and ability requirements will differ across the rank spectrum. It is reasonable to expect a 16 year Lieutenant Colonel serving as a deployed squadron commander will require different level of technical skill than a 6 year Captain deployed as a Mission Systems Flight commander 2) It is also likely feelings of technical self efficacy will differ with rank and experience.

## **Sample Selection and External Validity**

In most research it is not practical or even possible to sample the entire population displaying the variable(s) of interest; in these situations the researcher must select a

subset, or sample, of the relevant population of interest. When sampling is used the results of the study can be used to make inferences, or generalizations, of the entire population if, and only if, the sample is truly representative of the entire population. If the sample is truly representative of the population the research is considered to have external validity (Leedy & Ormrod, 2005). In most cases the ideal method for choosing a representative sample is through probabilistic simple random sampling. Simple random sampling is characterized by creating a sampling method that allows for each member of a population of interest to have an equal chance of inclusion in the study. However, due to various constraints most research does not have the luxury of pure random selection; in these cases a non-probabilistic random sampling method is used (Schloss & Smith, 1999).

This study uses a non-probabilistic purposive method for random sample selection; this sampling technique was selected on the basis of specialized knowledge and experience inherent to the population of interest. The population of interest for this study is a homogenous group of Air Force officers defined by a core set of technical skills distinct to the communications and information career field. This baseline of technical skill sets are largely unaffected by the unit or organization in which any one individual may be assigned. In addition, with few exceptions, any 33S officer of the same rank is just as likely to be subject to a particular deployment experience as the next. These two factors combine to make any adequate sized sample of deployment experienced 33S officers a true representative sample of the entire population of interest thereby providing a high level of external validity to the research. In this case, the systematic sampling of units containing large numbers of 33S officers regardless of MAJCOM or agency

affiliation is the most efficient means of collecting data. However, the relevant population in this study contains several distinct strata defined by rank. Each rank appears in a significantly different proportion in relation to the relevant population as a whole; for this reason a proportional stratified sampling would be ideal but will most likely not be attained through voluntary participation.

**Table 3-2** 33S Career Field Stratification

<b>Rank</b>	<b># of Persons</b>
<b>2d Lt</b>	<b>385</b>
<b>1st Lt</b>	<b>624</b>
<b>Captain</b>	<b>1454</b>
<b>Major</b>	<b>866</b>
<b>Lieutenant Colonel</b>	<b>405</b>
<b>Colonel</b>	<b>119</b>
<b>Totals</b>	<b>3853</b>

Source: HQ AFPC/DPAPDT, Jan 2007

Adequate sample size is another significant factor influencing external validity. Statisticians have developed formulas for determining minimum sample size based on the size of the population; however, the ability to meet this criterion is often constrained by pragmatics and limited resources. As such, the basic rule in research is the larger the sample size the better (Leedy & Ormrod, 2005). The following population proportion formula provided by McClave, et.al (2005) was applied to find the minimum sample size required:

$$n = \frac{(z_{\alpha/2})^2 (pq)}{(SE)^2}$$

Where      n      = sample size required  
 $(z_{\alpha/2})^2$     = 90% confidence factor  
 p            = desired sample size factor  
 q            =  $(1-p)$   
 SE          = sampling error, equal to  $\frac{1}{2}$  the desired mean confidence interval

The value of (p) and (q) must be approximated to solve the equation. A desired sample size factor of (.5) produces the largest product of (pq) and represents an overly conservative large sample size.  $(z_{\alpha/2})^2$  represents the distance between any given measurement and mean of a population expressed in standard deviations and the desired confidence interval is (.1). The following conservative minimum sample size is recommended when applying the formula:

$$n = \frac{(1.645)^2 (.5) (.5)}{(.05)^2} \approx 270$$

Participation in the study was completely voluntary and as such the minimum requisite sample size was not met according to the formula provided by McClave, et.al (2005). With that said, in general relatively small sample sizes can be used when other elements of the study indicate reasonable power to suggest external validity (Schloss & Smith, 1999). In lieu of increasing sample size this study takes advantage of unique characteristics inherent in the population to increase external validity. First, homogeneity, how alike or different the characteristics, of the population of interest is widely recognized as a significant factor in determining an adequate sample size (Leedy & Ormrod, 2005). In this case, as stated earlier, homogeneity exists to a large degree in this population of interest significantly reducing the need for an overwhelmingly large sample. Second, this study takes advantage of what is known in statistic analysis as the Central Limit Theorem. Central Limit Theorem states that when a sample is sufficiently large enough,  $\geq 30$  in most cases, the sample population takes on the characteristics of the underlying population creating a normal distribution (McClave, et.al, 2005). These

factors combine to make the obtained sample size adequate for generalization with respect to the population of interest as a whole.

## **Survey Development**

The survey instrument was developed utilizing previous research efforts conducted by Schmidt (1997), Phillips (1998), and Little (1999). These previous efforts focused on interpersonal, managerial, and technical skills in general. As such, the survey instrument used in this research was modified significantly from the previous efforts to meet the needs of a much narrower and more defined topic. In addition to the aforementioned research efforts this survey is also comprised of a metric-based job analysis questionnaire. The survey contains four primary areas: instruction and disclosure; demographics; knowledge, skill, and ability assessment; and training and education.

The survey opens with instructions and disclosure for the participants. This area provided explanation of the purpose and intent of the survey as well as announcing that participation is completely voluntary and that no responses of any kind will be attributed to any individual choosing to participate. This part also provided instruction on how to complete and submit the survey as well as contact information to ask questions if needed. Finally, the opening section provides a definition for the term “technical” as it relates to this research effort.

Section A of the survey was designed to capture demographic information of the responders that are relevant to the research. Information gathered in this section includes deployment experience, AFSC and skill level, and number of years experience as a communications and information officer. This section also ask responders to rate the

importance of how they feel having technical skills are to a successful deployment and how technically well prepared they felt upon arrival in their most recent deployed location. In addition, this section also attempts to gather which UTC the member deployed under, what level of responsibility the responder had while deployed, what the main mission of the deployed location was, and whether any specialized technical training was required prior to the deployment. The information gathered in this section was intended to be used to differentiate technical knowledge, skill, and ability requirements by rank, level of responsibility, and deployed mission. It was also used to assess deployment experienced 33S officers' opinions on the importance of technical knowledge and skill in deployed environments as well as the overall feeling of technical preparedness in the career field.

Section B of the survey is a deployed technical knowledge, skills, and ability requirements assessment. This section is comprised of 64 technical knowledge, skills, and/or abilities (KSAs) classified into six core technical sub areas: network operations, network infrastructure, information management, communications implementation and planning, mission systems, and multimedia operations. The respondents are first asked to identify one or more of the six core areas listed as their primary area(s) of responsibility while deployed; they are also given the option to enter an area of responsibility not included in the core six. The 64 technical KSAs are derived from 16 communications Career Field Education and Training Plans (CFETP). Each KSA included in the survey has been identified as a core task in at least one of the 16 CFETPs. The respondents are instructed to identify which of the 64 KSAs listed he/she was required to use during their

most recent deployment. Upon identifying a KSA as required the respondent is then asked to answer three questions pertaining to that particular KSA; the three questions are:

- 1) How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job?
- 2) Did you have this knowledge prior to your deployment?
- 3) How did you acquire this knowledge?

The first question is measured on a five-point Likert scale ranging from minor to critical.

A Likert scale was chosen because of its particular usefulness to evaluate levels of agreement or disagreement among individuals or groups when measuring qualitative characteristics such as feelings and attitudes (Leedy and Ormrod, 2005). In addition, the Likert scale lends itself easily to conversion into numerical data for the expressed purpose of statistical analysis (Thomas, 2003). The second and third questions are used as complimentary measurements of preparedness. The second question identifies if the KSA was possessed prior to deployment thus indicating preparedness; the third question identifies through what primary method the KSA was attained. The information gathered in this section was intended to identify which KSAs are most important to succeeding in a deployed environment and how the career field in general has acquired these skills.

Section C is designed to assess the education and training level of the career field. The section asks if respondents hold technical degrees in the communications and information systems fields of study. It also gathers information on how much and what type of technical training has been received since being appointed a 33S officer. The information in this section is designed to analyze the impact of technical degrees and technical training on overall feelings of preparedness.

## **Survey Testing and Internal Validity**

The extent to which accurate conclusions can be drawn from the data collected and analyzed in a particular research effort refers to internal validity of the research. Internal validity is of highest concern when conducting experimental research specifically designed to determine cause and effect relationships among variables (Leedy & Ormrod, 2005). This study is not experimental cause/effect research; however, internal validity is important in all research to some degree.

The primary threat to internal validity in this study is questionnaire/survey design; as such, extensive review among several parties was conducted to reduce internal threat. First, the survey was designed by the author with input from several 33S officers with both deployed communications experience and post- graduate research education. The survey was then submitted to HQ ACC/A6 Readiness Branch for review and input. Finally, the survey instrument was submitted to two 33S AFIT faculty and one civilian PhD faculty member for review and approval. Several iterations of the survey were required prior to approval. Upon approval the survey instrument was tested by distributing to thirteen 33S AFIT students for validation before actual release to the sample population.

## **Reducing Error**

All human research assumes subjects exhibit characteristics that can be observed and measured in some capacity; it also assumes that all means of measurement contain some degree of error resulting from uncontrolled or unrecognized variability in the measurement therefore an attempt must be made to minimize possible sources of error (Schloss & Smith, 1999).

Actions have been taken to reduce the two most likely sources of error in this study: observation and procedural errors. First, observation errors are likely to increase when the scope of observation is excessively broad. It is recommended that survey instruments be designed to assess few overarching concepts with several measurement items within each concept as opposed to several concepts with few measurement items for each concept (Schloss & Smith, 1999). To combat observation errors the survey was limited to six core 33S general knowledge, skill and ability areas as identified in the 33S CFEPT. Each general area is comprised of a minimum of five (Information Management) and a maximum of twenty (Network Operations) individual measurement items with a mean of eleven.

Procedural error can occur from the inconsistent administration, recording, scoring, and interpretation of responses. Procedural error is reduced by strict adherence to a set of objective administration procedures (Schloss & Smith, 1999). Several steps have been taken to minimize procedural error. First, comprehensive instructions were incorporated into the survey to ensure standard responses. Written instruction was provided at the beginning of the survey instrument for completion and submission of the instrument and the KSA assessment portion provided detailed response instructions in the headings of each page. Contact information was provided to give respondents an opportunity to ask questions concerning completion/clarification of the instrument. In addition, submission of completed surveys was automated to ensure consistent accurate submission upon completion of the survey. Finally, responses were received and stored as electronic data files to preserve the integrity of the respondent's data. The stored data

files were automatically imported into statistical analysis software eliminating the possibility of human error in transcribing responses.

### **Survey Administration and Collection**

The survey, along with a memo identifying the research effort's sponsor and elaborating on the study's purpose, was electronically distributed to 36 commanders of various communications organizations across the Air Force. Several organizations chosen were selected for their high concentration of 33S authorizations as identified in AFPC's Assignment Management System and other organizations were chosen to provide a broad sample across functional areas and Major Commands. The decision to allow participation in the study was at the sole discretion of the respective unit commanders; this was clearly stated in the request for participation sent to unit commanders. The survey request allowed 15 days for completing and returning the questionnaire. The survey responses were collected via email response in the form of an .xml data file. The .xml data files were sequentially numbered and saved on electronic storage media as they were received.

### **Data Analysis Procedures**

Stored survey data files were first imported into Microsoft Excel for compilation into a readable aggregate format; Likert scale responses were automatically coded into numerical interval data for the purpose of statistical analysis. The summary of data was then analyzed various ways to answer the guiding research questions from Chapter 1.

First, demographic information of respondents was presented in a descriptive manner (i.e. rank, time in career field, deployed experience, etc...) and presented in table format. Next, mean scores were computed from Section A of the survey instrument,

questions 7 and 8, to answer guiding research questions 1 and 2. Finally, the 64 KSAs were tabulated and analyzed to identify which skills are used in deployed environments and means were computed to identify the level of importance of individual KSAs. The KSAs were then grouped into to the six core categories and means were computed for each category. The categories were then analyzed using analysis of variance and statistical pair-wise comparison to identify significant differences. Primary training source data was also gathered; frequency tabulation was used to identify how 33S officers are primarily gaining the necessary KSAs to succeed in deployed environments.

In answering the original guiding research questions several opportunities arose during data analysis to test inferences, in the form of null and alternative hypotheses, about the population of interest. The inferences were tested using statistical analysis for the purpose of supporting external validity; the detailed results are presented Chapter 4.

## IV. Data Analysis

### **Overview**

This chapter begins by summarizing data using detailed descriptive statistics of the survey results and concludes with statistic analysis to test the inferences made in the hypotheses below. Again, the purpose of this survey is to identify how important 33S officers feel technical knowledge, skills, and abilities are to succeeding in a deployed environment, how technically prepared they feel to deploy, and finally, identify what technical skill sets they feel are important to success in a deployed environment. In answering the original guiding research questions opportunities arose during data analysis to make inferences about the population of interest. The inferences were formed into null hypotheses (what is believed to be true) about the population and tested against alternative hypotheses. Null and alternative hypotheses are represented by  $H_0x$  and  $H_a$  respectively. The following is a summary of the original guiding research questions and hypotheses relating to the respective guiding questions:

**Research Question 1** – Are C&I officers technically prepared for deployments in forward operating locations?

$H_01$  – C&I officers are adequately prepared technically for duty in deployed environments.

$H_a1$  – C&I officers are less than adequately prepared technically for duty in deployed environments

$H_02$  – Technical degrees do not significantly increase technical preparedness for 33S officers

$H_a2$  – Technical degrees do significantly increase technical preparedness for 33S officers

**Research Question 2** – To what extent are technical knowledge, skills, and abilities (KSAs) necessary for C&I officers to succeed in a deployed environment?

H03 – Technical KSAs are a significant need in deployed environments

Ha3 – Technical KSAs are less than a significant need in deployed environments

H04 – Necessity for technical KSAs are the same for executive officer deployments than for other 33S deployments

Ha4 – Necessity for technical KSAs are different for executive officer deployments than for other 33S deployments

**Research Question 3** – What technical knowledge, skills, and abilities are most important in succeeding as a C&I officer in a deployed environment?

H05 – Significant differences do not exist in the criticality of technical KSAs of at least one of the six core technical knowledge areas

Ha5 – Significant differences do exist in the criticality of technical KSAs in at least one of the six core technical knowledge areas

### **Response Summary**

The survey instrument was solicited to 36 C & I unit commanders across the Air Force. The choice to allow unit participation in the study was at the sole discretion of the respective unit commanders; in addition, individual participation in the study was completely voluntary. As a result, the study includes one or more responses from 22 of the 36 organizations originally solicited. 122 surveys were returned electronically via email attachment. 44 respondents indicated they had not had any deployment experience as a 33S and therefore their responses were of limited use; unless specifically addressed

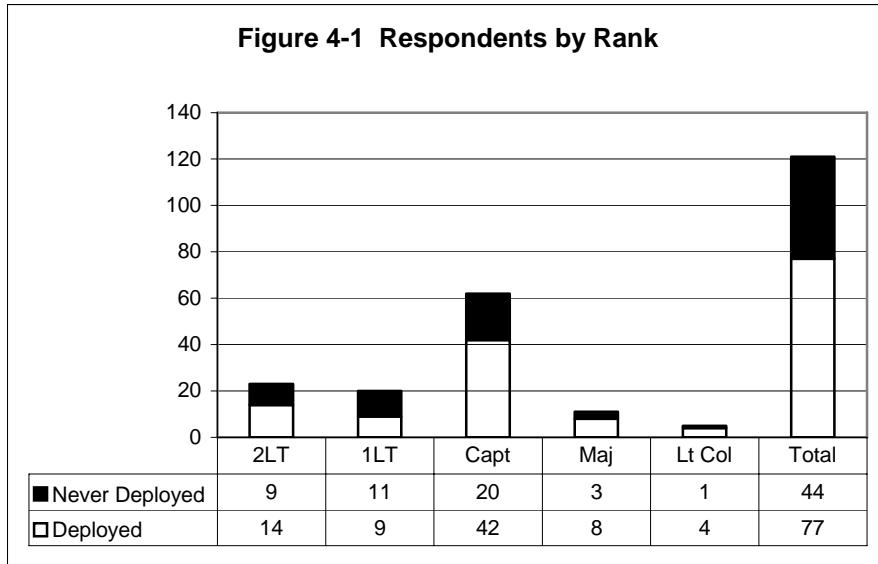
the rest of this analysis refers to deployment experienced respondents only. In addition, one survey response was excluded due to inconsistent data; the respondent indicated he/she had never been deployed as a 33S but continued the survey to identify KSAs required during his/her last deployment. In the end, data from 77 deployment experienced 33S officers were included for analysis.

## **Descriptive Statistics**

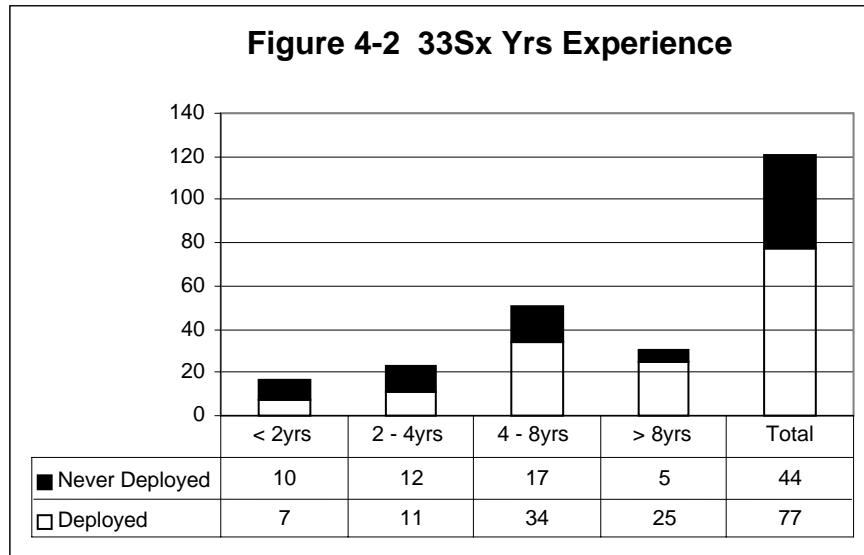
The survey consisted of three sections: Section A, Demographics and Deployment Experience; Section B, Deployed Knowledge, Skills, and Ability Requirements Assessment; and Section C, Training and Education. The following is a purely descriptive account of survey responses of each section:

### **Section A: Demographics and Deployment Experience**

Rank: Approximately 36% of respondents hadn't any deployment experience. Just over half of the respondents held the rank of captain during their last deployment; 1<sup>st</sup> and 2<sup>nd</sup> lieutenants were the next largest groups respectively followed by majors and lieutenant colonels. Company grade officers made up approximately 84% of the deployment experienced respondents in comparison to 16% for field grade officers. The overwhelming proportion company grade respondents combined with the low participation rate eliminates the possibility of making valid inferences concerning differences between the two groups.



33S Experience: Data captured pertains to respondents' years experience as a 33S officer only. No attempt was made to control for variables such as prior enlisted experience or previous commissioned career field experience. It is recognized these factors could significantly contribute to the sum of military experience but due to the limited scope and specific purpose of this research would have no bearing on the outcome and were thus excluded. Figure 4-2 shows 41% of respondents with less than two years, 48% with 2-4yrs, 67% with 4-8yrs, and 83% with greater than 8yrs have had 33S deployment experience.



In addition, Table 4-1 shows a breakdown of respondent AFSCs. The vast majority of respondents held the 33S3 AFSC which was expected as this is the most common AFSC among C&I officers.

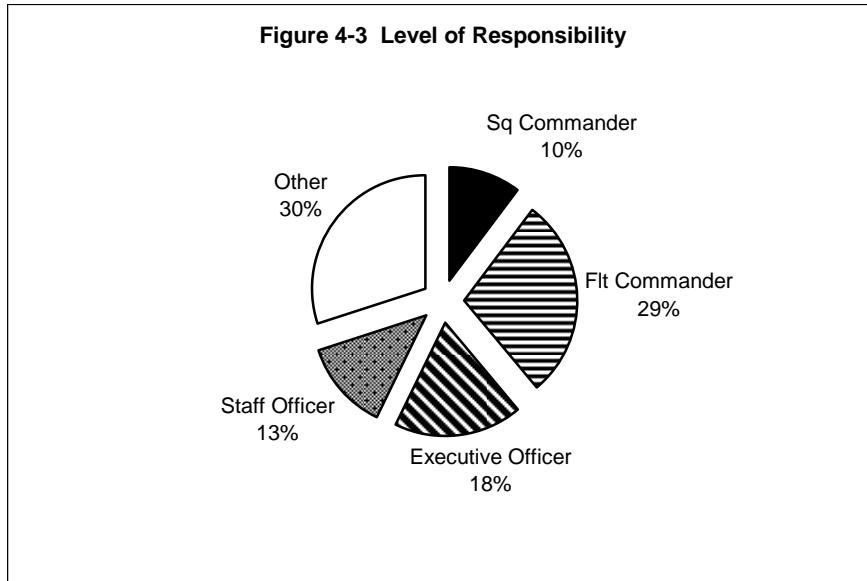
**Table 4-1 AFSC Breakdown**

AFSC	# of Respondents	% of Respondents
33S1	15	19.48%
33S3	47	61.04%
33S4	11	14.29%
Other	4	5.19%
TOTAL	77	100.00%

\* Other AFSCs provided: 33S3A(engineer) and (3) C33S3(commander designator)

Level of Responsibility in Deployed Environments: Figure 4-3 graphically depicts 10% of respondent's most recent deployment entailed duty as a squadron commander or equivalent, 29 % as a flight commander or equivalent, 18% as an executive officer, 13% as a staff officer, and 23% in some other capacity. Field grade officers predominantly deployed as squadron commanders or staff officers, however, 2 of the 8 respondents deployed as squadron commander held the rank of captain. CGOs

deployed responsibilities entailed a wide range of duties accounting for 20 of the 22 “Other” responses summarized in Table 4-2.



**Table 4-2 Summary of Level of Responsibility “Other” Responses**

Rank	Responsibility
2LT	Operations Officer
2LT	NCC Chief
2LT	Network Engineer
2LT	Planning and Engineering
2LT	Led a team of 5 contractors
2LT	NCC Chief
2LT	Deputy Flight Commander
1LT	Network OIC
1LT	Squadron-level Project Manager / Engineer
1LT	Project manager
1LT	AFNORTH CAOC CFP OIC
CAPT	Information Security Officer
CAPT	UTC - Team Leader
CAPT	C-6 Watch Officer / Project Officer
CAPT	Project manager
CAPT	OIC, Information Management Division
CAPT	deputy chief
CAPT	Deputy Flt Commander
CAPT	CFACC Info Assurance Officer
CAPT	Help Desk OIC
CAPT	Systems Watch Officer
MAJ	Air Liaison Officer to JSOTF
LT COL	Task Force Chief

Deployment Experience: 66% of the respondents have had only one deployment experience. 23% have 2 deployments, 4% with 3 deployments, and 6% with 4 or more deployments. Noteworthy is the fact that 17 of 51 respondents with only one deployment have been a 33S less than 4 years while only 23% have been in more than 8 years.

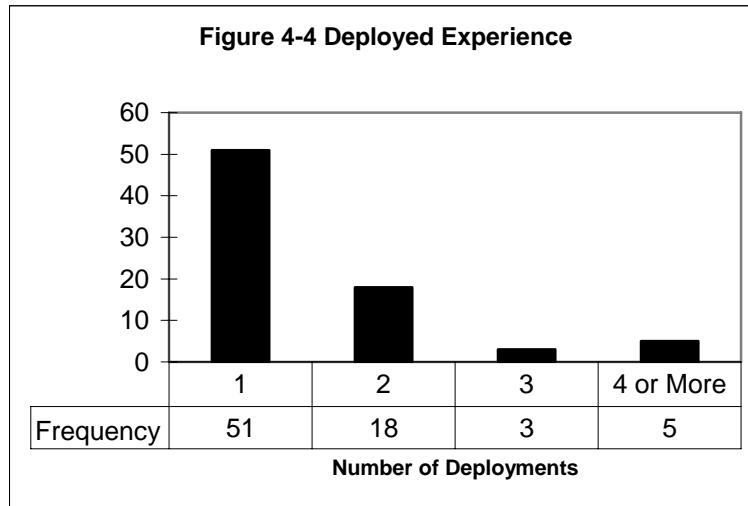


Table 4-3 shows a summary of UTCs which respondents identified as having deployed on. Only 24 responses had UTCs identified; of these, the 6KTxx grouping (theater deployable communications elements) was the most commonly identified. 6KNX3 (individual tasking to provide staff support for C & I functions at a deployed location) was the only other UTC listed more than once.

**Table 4-3 Listing of UTCs Deployed Under**

<b>UTC s Deployed Under</b>	
6KLS1	6KTEB (2)
6KMJ7	6KTEC (2)
6KNX3 (5)	6KTED
6KNZ40	9AAGL
6KQA1	9AAGS
6KTDD (3)	F66V1
6KTE1	K199G
6KTEA	XKNYA

Figure 4-5 shows that 75% of respondents' most recent deployments have occurred in the past three years while 88 % has occurred in the past five years. Only 12% (9 of 77) respondents reported their most recent deployment as being prior to 2003 with only 4% (3 of 77) prior to 2000.

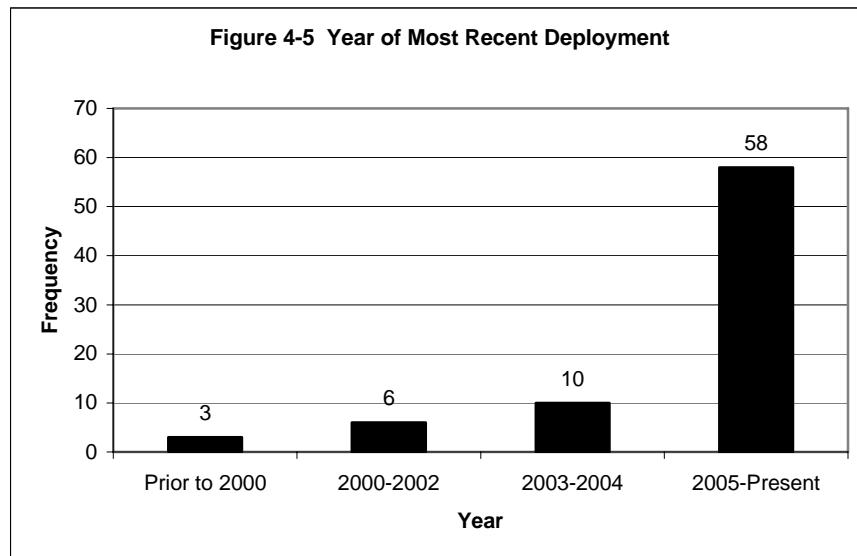


Table 4-4 shows primary missions of deployed locations where respondents have deployed. Support bases and combat operations bases account for 70% of respondents' deployed locations. Table 4-5 is a listing of comments explaining the 20 "Other" responses.

**Table 4-4 Primary Mission of Forward Operating Locations where 33S have Deployed**

Base Operating Support	34
Province Reconstruction	2
Combat Operations	20
Host Nation Advisory	1
Other	20

**Table 4-5 Primary Mission of Forward Operating Locations where 33S have Deployed (Other)**

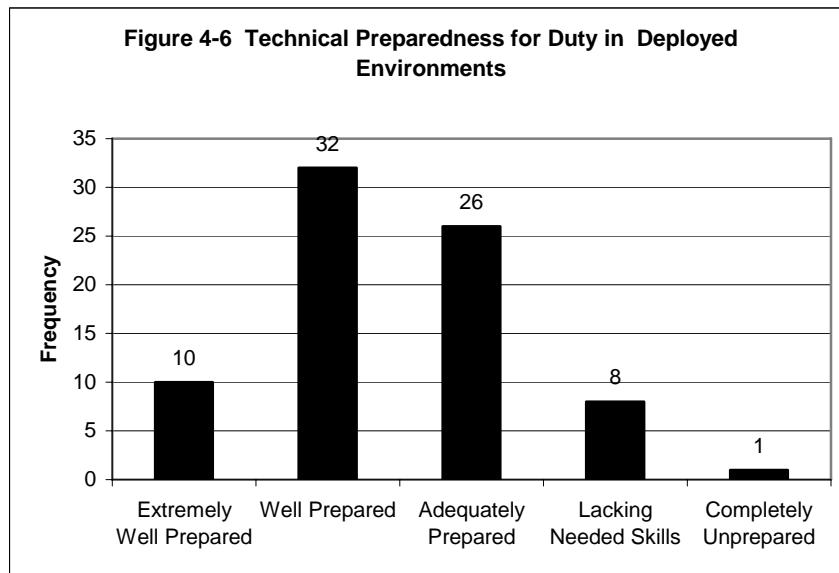
Initial Comm to support Asian Games
ISR for combat and combat support operations in AOR
CENTAF NOSC Support
OIF/OEF Theater Communications Support
Humanitarian Relief
AFNORTH CAOC
Expeditionary Intelligence
Coalition Nations Support
NATO Compliance Inspections
CENTCOM HQ J6 Staff
Communications Operations and Engineering
US CENTCOM HQ
CENTCOM HQ
Homeland Security, NOBLE EAGLE
Personal Security Liaison Officer for VP of Iraq
Staff officer (CFLCC C6 LNO)

13 respondents reported having to receive specialized technical training prior to their most recent deployment. A summary of the training is provided in Table 4-6. It should be noted that several of the specialized technical skills training listed, although important, is not specific to the C & I career field. Also, one respondent identified having to attend specialized training but failed to provide course(s) attended.

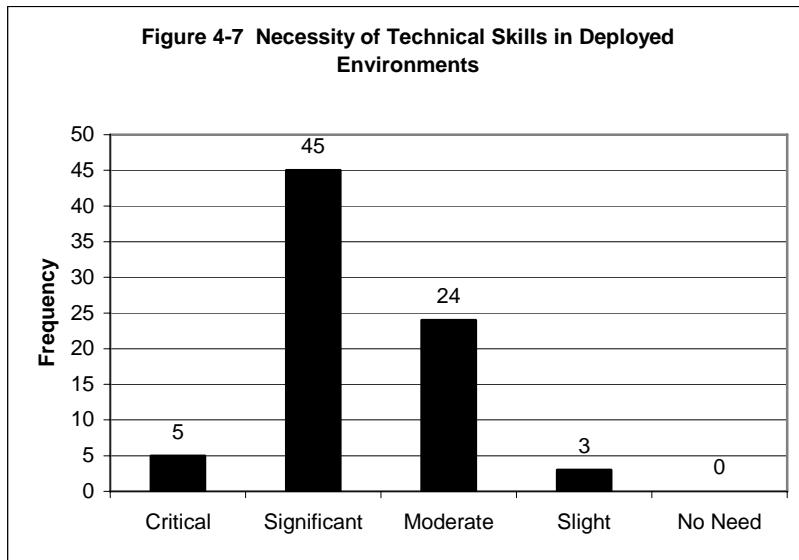
**Table 4-6 Summary of Specialized Training Received Prior to Deployment**

<b>UTC</b>	<b>Specialized Training Attended</b>
Unknown	Weapons training, Chemical Warfare training, and COMSEC training
6KT??	Mobility School
Unknown	Microsoft Windows Server 2003 and Exchange 2003 Server; DNS and TCP/IP
Unknown	Network Management, HP Openview, CiscoWorks, Network layout and workings
6KT??	Theater Deployable Communications Systems Planner Course
9AAGL	Expeditionary Combat Skills Training
9AAGS	Combat Skills Training
Unknown	Combat convoy course
K199G	Weekly State Dept interaction / Passport Specific / Daily Host Nation interaction / Weekly Embassy interaction
Unknown	Executive Officer Course (Keesler AFB)
6KQA1	Radio Direction Finding (a little of spectrum analysis/EMI survey)
6KMJ7	Combat Comm Readiness Skills Training

Technical Preparedness to Deploy: Technical preparedness was measured on a five-point Likert scale ranging from extremely well prepared to completely unprepared. 88% (68 of 77) respondents stated they were adequately prepared or better for deployment. Only one respondent reported being completely unprepared for deployment while ten reported being extremely well prepared; 100% of field grade officers reported being adequately prepared or better.



Necessity of Technical Skills in a Deployed Environment: Necessity of technical skills was also measured on a five point Likert scale ranging from critical need to no need. Figure 4-7 shows 100% of respondents feel at least a slight need for technical skills in a deployed environment. 96% report technical skills as being moderate need or higher with a significant need being the most common response at 58%. 91.6% (11 of 12) field grade officers rated technical skills as a moderate need or higher while 96.9% (63 of 65) company grade officers did the same.



## **Section B: Knowledge, Skills, and Abilities Requirements Assessment**

Section B of the survey instrument was intended to identify technical KSAs most needed in deployed environments. Figure 4-8 uses a histogram to visually depict mean distribution of required KSAs. The five point Likert scale used to measure the criticality of the KSA provided the following choices: minor, limited benefit, useful, necessary, and critical. The responses were then numerically coded 1 (minor) through 5 (critical) to derive a mean criticality value. The graph shows 84% ( 54 of 64) of KSAs rated in the survey received a mean criticality rating between 2 (limited benefit) and 4 (necessary). 53% (34 of 64) received a mean rating between 2.75 and 3.25 indicating the KSAs are useful in a deployed environment.

**Figure 4-8 Distribution of KSAs 1 - 64 Mean Criticality Values**

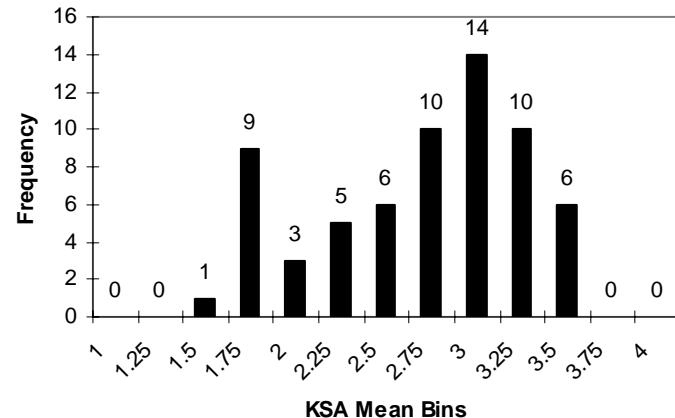


Table 4-7 breaks the KSAs down into the six core general knowledge areas identified in the survey. Network infrastructure and Network Operations received the highest criticality mean scores. The mean number of respondents per KSA in core areas was calculated by adding the total number of respondents for each KSA in a core area and dividing by the total number of KSAs in each respective core area. Network Operations and Network Infrastructure core areas had the highest mean number of respondents identifying KSA as required; Multimedia and Information Management received the lowest mean scores. In addition, Multi Media was also identified as the least needed skill set in a deployed environment by virtue of the lowest number of respondents per KSA .

**Table 4-7 Mean Criticality Values of Core KSA Areas**

Core Area	Number of Individual KSAs in Core Area	Total Number Responses in Core Area	Mean Number of Responses per KSA in Core Areas	Core Area Mean Critical Value (1-No Need, 5 Critical Need)
Network Ops	20	1037	51.85	2.79
Network Inf	10	492	49.20	2.84
Info Mgmt	5	221	44.20	2.07
Multi Media	10	390	39.00	1.76
Comm P&I	6	298	49.67	2.71
Mission Systems	13	544	41.85	2.71
Totals	64	2982	46.59	2.56*

\* This was calculated by averaging the critical value of the 64 individual KSAs. If you average the 6 core group means as shown in the table you get a mean critical value of 2.48

In addition to identifying the required KSAs respondents were also asked whether or not they possessed the requisite knowledge, skill, or ability prior to their deployment. Of the 2982 core area responses, respondents claimed knowledge of the respective KSA prior to deployment just 53% of the time. No prior knowledge was claimed 37% of the time and the remaining 10% was not identified as either known or unknown prior to deployment.

Furthermore, respondents were asked to identify their primary method of attaining the requisite knowledge skill or ability. Three choices were given for answering this question: On-the-Job Training (OJT), Technical Training (i.e. BCOT, OTR, etc...), or Formal Education (i.e. undergraduate/graduate studies). Table 4-8 summarizes respondent's claims for primary method of obtaining required knowledge.

**Table 4-8 Primary Methods of Obtaining Requisite Knowledge, Skill or Ability**

Core Area	OJT	Tech Trng	Form Ed	Total
Network Operations	71.2%	15.6%	13.2%	100.0%
Network Infrastructure	50.4%	21.9%	27.7%	100.0%
Information Management	84.2%	15.8%	0.0%	100.0%
Multimedia	87.1%	7.9%	5.0%	100.0%
Comm Planning and Implementation	66.4%	32.7%	0.9%	100.0%
Mission Systems	74.9%	20.0%	5.1%	100.0%

This section also included an open ended qualitative question soliciting additional information regarding technical knowledge, skills, and abilities not specifically addressed in the survey. A common theme of these responses centered on the need for quality technical training and on the job experience prior to deployment. Basic Communications Officer Training was addressed several times; the common theme of these comments imply BCOT as a somewhat useful familiarization course that develops little or no technical abilities in the officer corp. The responses varied widely in scope and are presented in their entirety in Appendix C.

### **Section C: Education and Training**

This section of the survey solicited information on the members training and education experiences. Relevant training and education data was gathered in an attempt to establish a correlation between technical preparedness and the type and quantity of training and education received. Types of data gathered included whether or not the member holds a communications related technical, attendance of basic and advanced communications officer training, and the amount and type/source of additional technical training received.

Technical Degrees: Table 4-9 indicates 66% of the respondents hold communications related technical degrees while 34% do not.

**Table 4-9 Technical Degrees Held by Respondents**

Technical Undergraduate or Graduate Degree in a Communications Related Field (i.e. Computer Science, Programming, etc...)		
Yes	No	No Response
51	26	0
66%	34%	0%

BCOT or Equivalent Attendance: Table 4-10 indicates 94% of the officers who responded have attended some form of basic communications officer training. 4% reported never having attended while 3% did not respond to this question.

**Table 4-10 BCOT or Equivalent Attendance**

Attended Basic Officer Communications Training Course or Equivalent		
Yes	No	No Response
72	3	2
94%	4%	3%

ACOT or Equivalent Attendance: Table 4-11 indicates only 23% of the officers who responded have attended some form of advanced communications officer training. 4% reported never having attended while 3% did not respond to this question.

**Table 4-11 ACOT or Equivalent Attendance**

Attended Advanced Officer Communications Training Course or Equivalent		
Yes	No	No Response
18	56	3
23%	73%	4%

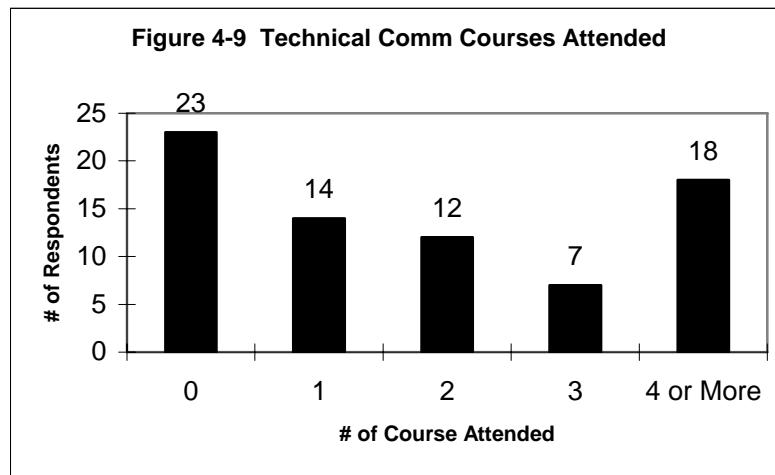
Additional Technical Communications Course Attendance: Table 4-12 indicates 66% of the officers who responded have attended some form of additional technical

based communications courses. 30% reported never having attended while 4% did not respond to this question.

**Table 4-12 Additional Technical Communications Course Attendance**

Attended Additional Technical Communications Courses		
Yes	No	No Response
51	23	3
66%	30%	4%

Figure 4-9 is a histogram showing the distribution of technical courses attended. Of the 51 respondents who reported attending additional technical training courses 35% (18) have attended 4 or more courses.

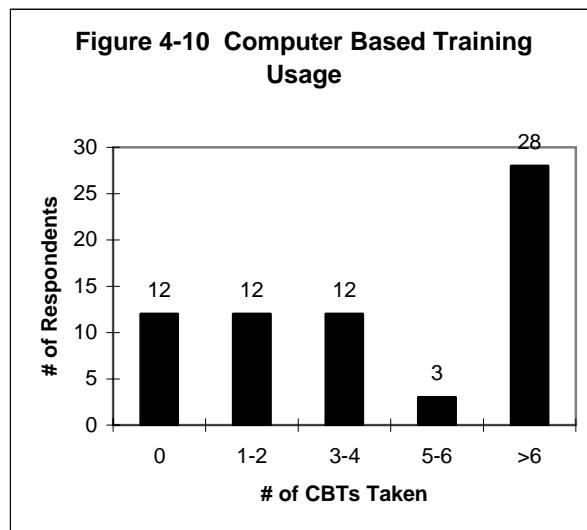


Communications Based CBT Courses Usage: Table 4-13 indicates 71% of the officers who responded have taken communications technical based CBT courses. 16% reported never having attended while 13% did not respond to this question.

**Table 4-13 Communications Based CBT Courses Usage**

Taken Computer Based Technical Training Courses		
Yes	No	No Response
55	12	10
71%	16%	13%

Figure 4-10 is a histogram showing the distribution of technical based CBT courses taken. Of the 55 respondents who reported taking CBT courses to improve their technical skills over 50% (28) have taken six or more courses.



## Inferential Statistics

The only way to be certain the data described in the previous section truly represents the population of interest is to have surveyed the entire population of 33S officers. This is generally not possible and certainly was not the case in this study. With that said, this section takes data obtained from the sample population as described in detail in the previous section and uses inferential statistical methods to test the hypotheses posed at the beginning of this chapter.

## Hypothesis 1

H01 – C&I officers are adequately prepared technically for duty in deployed environments.

Ha1 – C&I officers are less than adequately prepared technically for duty in deployed environments

Recall that technical preparedness was measured on a five point Likert scale 1 being unprepared and 5 being extremely well prepared. In this case, the null hypothesis represents a value of 3.00. Alternatively H01 and Ha1 can be written as follows:

$$H01: \mu \geq 3.00$$

$$Ha1: \mu < 3.00$$

This hypothesis was tested using a lower one-tail z-value test statistic with a reliability factor of  $\alpha = .05$ . z-values measure the distance between the value of the sample mean and the mean specified in the null hypothesis in terms of standard deviations;  $\alpha = .05$  represents a z-value of -1.645 in a lower one-tail test.

The z-value test statistic is calculated using the following formula:

$$z = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

Where:       $\bar{x}$  = sample mean  
                 $\mu$  = mean specified in null hypothesis  
                s = sample standard deviation  
                n = number of respondents

Table 4-14 shows descriptive statistics of the sample population as it pertains to technical preparedness for deployment.

**Table 4-14 Technical Preparedness Descriptive Statistics**

<i>Technical Preparedness</i>	
Mean	3.545454545
Standard Error	0.102172998
Median	4
Mode	4
Standard Deviation	0.896564416
Sample Variance	0.803827751
Kurtosis	-0.124068533
Skewness	-0.308585375
Range	4
Minimum	1
Maximum	5
Sum	273
Count	77

The z-value was calculated as follows:

$$z = \frac{3.545 - 3.00}{.897 / \sqrt{77}}$$

$$z = 5.343$$

The z-value of 5.343 is much larger than the reliability factor of -1.645 thus we must fail to reject the null hypothesis and believe the true technical preparedness of 33S officers is at least adequate for serving in deployed environments.

### Hypothesis 2

H02 – Technical degrees do not significantly increase technical preparedness for 33S officers

Ha2 – Technical degrees do significantly increase technical preparedness for 33S officers

Alternatively H02 and Ha2 can be written as follows:

$$H02: (\mu_1 - \mu_2) = D_0$$

$$Ha2: (\mu_1 - \mu_2) > D_0$$

Where:  $\mu_1$  = technical preparedness mean of respondents holding technical degree  
 $\mu_2$  = technical preparedness mean of respondents with no technical degree  
 $D_0$  = null hypothesized difference in means, in this case  $D_0 = 0$

Using Microsoft Excel, Hypothesis 2 was conducted by randomly selecting twenty technical preparedness responses from each sub group. The responses were then tested using a small sample t-Test for comparison of population sample means with  $\alpha = .05$ ; the results are shown in Table 4-15.

**Table 4-15 Microsoft Excel t-Test Comparing Two Sample Means**

	Technical Degree - Yes	Technical Degreee - No
Mean	3.75	3.45
Variance	0.723684211	0.471052632
Observations	20	20
Pearson Correlation	0.202824144	
Hypothesized Mean Difference	0	
df	19	
t Stat	<b>1.3708103</b>	
P(T<=t) one-tail	<b>0.093205718</b>	
t Critical one-tail	<b>1.729132792</b>	

Analysis of Table 4-15 warrants failing to reject the null hypothesis. A reliability factor (alpha) of .05 produced a t- test statistic of 1.37 which is less than the critical t-statistic of 1.73. Also of interest is the one-tail p-value. The p-value represents the probability of observing another test statistic that is the same or more contradictory to the null hypothesis as the t-statistic produced from the original sample data. If the p-value is larger the alpha used in the test you must fail to reject H0; in this case p-value 0.18 is larger than the alpha .05.

### Hypothesis 3

H03 – Technical KSAs are a significant need in deployed environments

Ha3 – Technical KSAs are less than a significant need in deployed environments

Again, necessity of technical knowledge, skills, and abilities was measured on a five point Likert scale with 1 being no need and 5 being a critical need. In this case, the null hypothesis represents a significant need value of 4.00. Alternatively H03 and Ha3 can be written as follows:

$$H03: \mu \geq 4.00$$

$$Ha3: \mu < 4.00$$

As with Hypothesis 1, this hypothesis was tested using a lower one-tail z-value test statistic with a reliability factor of  $\alpha = .05$ .

The z-value test statistic is calculated using the following formula:

$$z = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

Table 4-16 shows descriptive statistics of the sample population as it pertains to necessity of technical knowledge, skills, and abilities in deployed environments.

**Table 4-16 KSA Necessity Descriptive Statistics**

<i>KSA Necessity</i>	
Mean	3.675325
Standard Error	0.074961
Median	4
Mode	4
Standard Deviation	0.657779
Sample Variance	0.432673
Kurtosis	0.264119
Skewness	-0.39565
Range	3
Minimum	2
Maximum	5
Sum	283
Count	77

Substituting information from Table 4-16 into the formula yields the following:

$$z = \frac{3.675 - 4.00}{.658 / \sqrt{77}}$$

$$z = -4.334$$

The -4.334 z-value derived from the sample data falls well left of the -1.645 lower bound thus sufficient evidence exists to reject the null hypothesis. 33S officers do not believe technical skills are a significant need in deployed environments. The test was run again using a modified hypothesis:

$$H03: \mu \geq 3.5$$

$$Ha3: \mu < 3.5$$

This produced a z-value of 2.334 causing a failure to reject the null. Thus the two results indicate that the true population mean lies closer to significant need than moderate need as measured in the survey.

#### Hypothesis 4

H04 – Necessity for technical KSAs are the same for executive officer deployments than for other 33S deployments

Ha4 – Necessity for technical KSAs are different for executive officer deployments than for other 33S deployments

Alternatively H04 and Ha4 can be written as follows:

$$H04: (\mu_1 - \mu_2) = D_0$$

$$Ha4: (\mu_1 - \mu_2) > D_0$$

Where:  $\mu_1$  = mean number of KSAs identified as required by officers deployed in duty positions other than executive officer

$\mu_2$  = mean number of KSAs identified as required by officers deployed as an executive officer

$D_0$  = null hypothesized difference in means, in this case  $D_0 = 0$

Using Microsoft Excel, Hypothesis 4 was conducted by randomly selecting ten aggregate KSA counts from each sub group. The responses were then tested using a small sample t-Test for comparison of population sample means with  $\alpha = .1$ ; and assuming unequal variance. The results are shown in Table 4-17.

**Table 4-17 t-Test: Two-Sample Assuming Unequal Variances Exec Duty vs. Other Comm Duties**

	<i>Other Comm Duty</i>	<i>Exec Duty</i>
Mean	38.3968254	28.71428571
Variance	571.5012801	607.9120879
Observations	63	14
Hypothesized Mean Difference	0	
df	19	
t Stat	1.336397098	
P(T<=t) one-tail	0.098602294	
t Critical one-tail	1.327728209	

Analysis of Table 4-17 allows for the rejection of the null hypothesis. An alpha of .1 produced a t- test statistic of 1.336 which is greater than the critical t-statistic of 1.32. Also of interest is the one-tail p-value. If the p-value is smaller than the alpha used in the test you must reject H0; in this case p-value 0.0986 is smaller than the alpha .1.

### Hypothesis 5

H05 – Significant differences do not exist in the criticality of technical KSAs of at least one of the six core technical knowledge areas

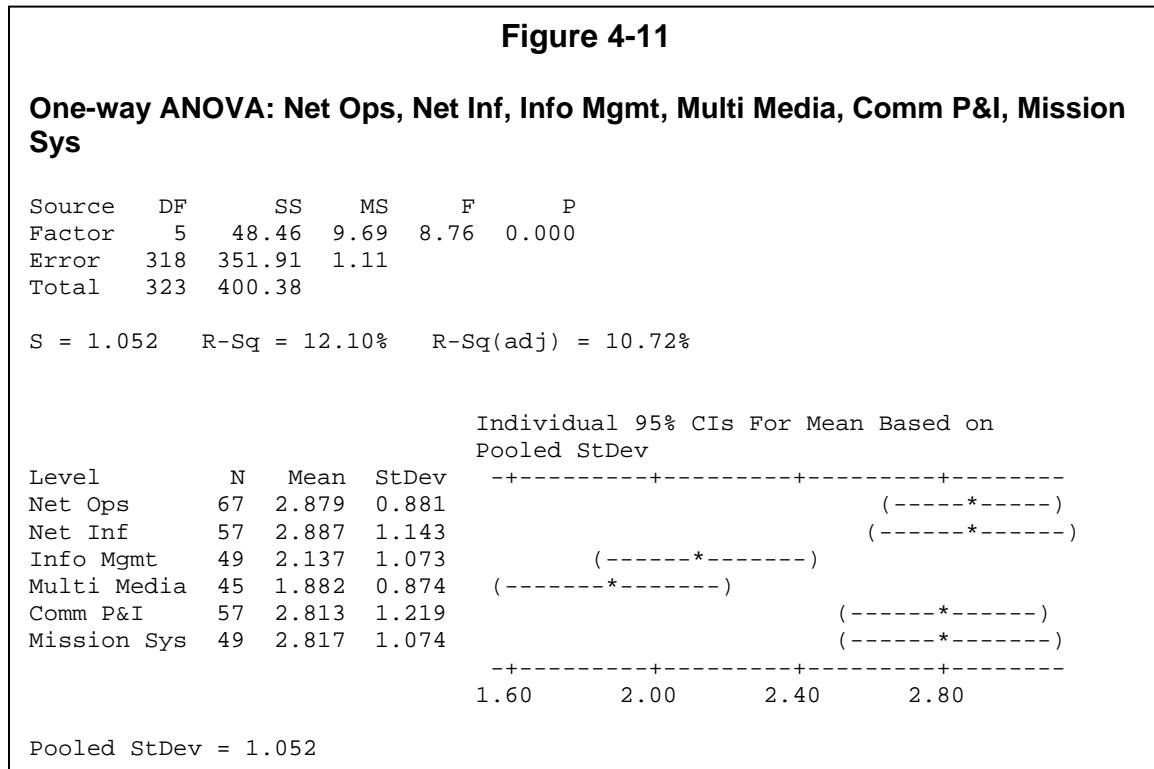
Ha5 – Significant differences do exist in the criticality of technical KSAs in at least one of the six core technical knowledge areas

Alternatively H05 and Ha5 can be written as follows:

$$H05: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6$$

$$Ha5: (\mu_1, \mu_2, \mu_3, \mu_4, \mu_5, \mu_6) \neq (\mu_1, \mu_2, \mu_3, \mu_4, \mu_5, \mu_6)$$

Hypothesis 5 was tested by first establishing individual mean critical values for each core knowledge area for each survey respondent (see Appendix D). A one-way analysis of variance (ANOVA) was conducted with and alpha of .05 using MINITAB statistical software. The results are presented in Figure 4-11.



The observed significance level of the ANOVA test resulted in a p-value = 0.000 providing sufficient evidence to reject the null hypothesis. Consequently it can be concluded that mean criticality scores are significantly different among the six core technical knowledge areas. However, the ANOVA does not necessarily tell what means are significantly different without a ranking the means with some measure of reliability.

Subsequently, a Paired t-Test with an alpha of .05 was conducted on each possible pair of core knowledge area means. The resulting p-values are summarized in Table 4-18.

**Table 4-18 P-Value Matrix From Paired t-Tests**

	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Mission Systems
Net Ops		.837	.000	.000	.728	.500
Net Inf			.001	.001	.803	.660
Info Mgmt				.146	.005	.001
Multi Media					.000	.000
Comm P&I						.059
Mission Systems						

Recall that p-values less than the alpha level used in the test, in this case .05, result in a rejection of the null. Analyzing Table 4-18 it can be determined the skill sets of Information Management and Multi Media are significantly different than the other four core skill sets in terms of how critical their need is to succeed in deployed environments. The only paired comparison these two skill sets did not have an observed significant difference was when paired against each other (p-value = .146).

### **Chapter Summary**

This chapter began by summarizing survey data using detailed descriptive statistics in the form of tables, charts, and graphs. The chapter concluded with statistic analysis to test hypothesized statements of what is assumed to be true about the population of interest against alternative truth statements.

## V. Conclusions

### Overview

This chapter attempts to assimilate all the information gathered during the course of this study and structure it into meaningful conclusions. This was done by answering the guiding research questions provided in Chapter 1 using data and information extracted throughout the course of this research. In addition, opportunities for future research to further enhance our ability to operate in a deployed environment are provided.

### Discussion

First, note that 75 % of the respondent's most recent deployed experience has been in 2005 or later; this significantly contributes to the utility of this study by capturing data that is current in terms of required knowledge needed in deployed environments.

Second, the most valuable part of this study may be the additional comments consolidated in Appendix C. Analysis of these comments shows a career field that is extremely diverse in terms of breadth of responsibility. The merging of communications career fields over the last decade or so has made it extremely difficult if not impossible to hone in on a core set of technical skills for 33S officers. The following comments extracted from Appendix C support this position:

- There is very little that I have used and applied in the Air Force that has come from a formal or deliberate training program, but rather through OJT or self study while trying to tackle a given problem..
- While technical training is important from a background standpoint, there is simply too much technical stuff out there for one person to be proficient in everything you will be hit with and in my case researching, learning just enough and implementing was a standard routine.

- I was not technically prepared for my deployment...I deployed under a different job than I had worked for the last year on active duty, so I had no experience
- ...broadening the career field...this makes it nearly impossible for one person to be proficient across all areas of the career field. I felt technically unprepared for this deployment but somehow managed to pick-up what I needed while in the hot seat.

Picking up knowledge on the “hot seat” is effective training; however, prolonged use of this proven technique jeopardizes mission accomplishment. Those of us responsible for providing communications support, but more importantly the war fighter depending on the systems we provide, can not continue to rely on OJT in forward operating locations as our primary means gaining the requisite knowledge. Really the only answer to this quandary is a clear concise description of the duty position, only then can we ensure getting the right people in the right place with the right skill sets. Simple, effective processes are needed for returning troops to provide quality feedback. AEF Functional Managers sorely need this feedback to establish useful, experience oriented, line remarks when filling taskings. Once clear KSA requirements are identified we can proceed forward in establishing the best way to acquire these skills before we arrive in theater.

With that said, the following section is a abridgment of findings to this study’s specific guiding research questions:

**Research Question 1** – Are C&I officers technically prepared for deployments in forward operating locations?

Let me preface by stating the overwhelming majority of respondents in this study were in the company grade officer ranks therefore no attempt was made to draw comparison or distinction between CGOs and FGOs in terms of technical preparedness.

Statistical analysis supports the assumption that 33S officers are technically prepared to deploy, at least to the level where they feel adequate in their ability to succeed in a deployed environment. This conclusion is somewhat contradicted by the fact that this research also identified that only 53% of the knowledge, skills, and abilities identified as being required in deployed locations were actually possessed by the individual prior to their deployments. However, of the ten most critical KSAs, respondents reported having acquired these skills 70% of the time prior to deployment.

*“Teaching is the only major occupation of man for which we have not yet developed tools that make an average person capable of competence and performance”*

Peter F. Drucker

Drucker's quote above implies two things: 1) teachers cannot instill competence and performance in students with instruction alone and 2) students simply cannot become competent and perform well without experience. The results of this study seem to support Drucker's position. For example, 94% of all respondents reported having attended basic officer's communication training. 66% report having attended one or more advanced technical training courses, while 71% have completed computer based training courses to improve technical skills. Despite all of the training attended 72% of all required technical knowledge, skills, and abilities were reported as being primarily

acquired through on-the-job training. This sentiment is further demonstrated in the additional comments provided by respondents; the following is some excerpts from additional comments assembled in Appendix C:

- “I was technically prepared only because of OJT in my in-garrison job...”
- “Of course, nothing beats practical experience. It's not reasonable to expect someone to have exposure in every subject matter”
- “While my formal training did briefly cover most of the concepts/items I needed on my deployment, I truly learned the most while at my deployed location using/being responsible for the equipment.”

With the restructuring of the baseline curriculum it appears the career field is heading in the right direction to support the proper balance of technical education, training, and experience for junior grade officers. ECOT is paired down to just the need to know basics of comm which is probably where it should be. In supplementing ECOT, plenty of opportunities exist for increasing technical skills. CBTs are freely available and indication from this study is that they are being utilized. 71% of respondents report having completed CBT courses and over 50% of them reported completing more than six. Additional communications courses are being utilized frequently as well, however, the distribution is skewed. The largest percentage of respondents (34%) reported not having attended any supplemental technical training courses while the second largest percentage (23%) reported having attended 4 or more. This distribution is indicative of the “haves” and the “have not’s” syndrome. Whether this is due to proximity of the available training, lack of funds, or other reasons is not known but it certainly needs remedied.

Another noteworthy piece of information extracted from this study is the fact that as a general rule possessing a communications related technical degree has no significant impact on an individual's technical preparedness. This assertion is supported through the inferential statistical analysis of Hypothesis 2 (H02) in Chapter IV. However, it should also be noted that the sample size used for comparison was small thus increasing the potential for true differences to go unnoticed. Also, this is not meant to imply that specific 33S billets do not benefit from formal technical education, just that the depth of the skills acquired in formal education are not generally needed in deployed environments.

In addition, there is no substitution for experience. With over 40% of 33S officers with less than two years time in the field having already deployed it is imperative new 33S accessions get practical experience through realistic training and/or exercises as soon as possible upon entering the career field. The best way to accomplish this is not addressed in this study.

**Research Question 2** – To what extent are technical knowledge, skills, and abilities necessary for C&I officers to succeed in a deployed environment?

Previous studies conducted by Schmidt (1997), Phillips (1998), and Little (1999) supported the relative importance of technical skills as being inferior to those of interpersonal and managerial skill sets. Although not tested directly, this study shows signs the skill set order of merit may be altered in deployed environments. Predicated on the experience of previously deployed 33S officers this research supports the fact that technical skills are a moderate to significant need in deployed environments with a mean

critical value between 3.5 and 4.0 on a five-point Likert Scale. Several respondents' additional comments also support this claim:

- “My specific job required high level knowledge of Server software and infrastructure devices. Understanding how network devices interacted in order to create and identify good network configurations and be able to explain it to others.”
- “...if I didn't know both the physical infrastructure side (fiber/copper) and the actual TCP/IP routing, I would have been delayed many times...”
- “Broad technical understanding is required in the deployed environment because the "book" answers simply do not cut it when deployed for the simple reason that when things break or go wrong, you have to find another way to continue comm support. If the comm CCO does not truly understand the various comm systems, they cannot provide proper guidance/support to the comm mission areas nor to the leadership who expect results in a deployed environment without issues/questions.”

Also, Hypothesis 4 (H04) in Chapter IV tested the necessity of having communications deployed as an executive officer as opposed to being deployed in other communications duty positions. The result was a statistically significant difference in the mean number of KSAs required for exec duty as opposed to other comm related duties. The p-value indicated only a minor significance. However, again a small sample size was used making it difficult to observe any difference; it is likely the difference will be amplified with a large sample. This result supports the position that it takes no special 33S knowledge, skills, or abilities to serve as an executive officer in deployed environments.

**Research Question 3** – What technical knowledge, skills, and abilities are most important in succeeding as a C&I officer in a deployed environment?

This research concludes that significant differences exist in the core technical skill sets required by 33S officers in deployed environments. Network Operations, Network Infrastructure, Communications Planning and Implementation, and Mission Systems were found to be significantly more important in deployed locations than the skill sets of Information Management and Multi Media services. Furthermore, 5 of the top 10 most critically needed skills as identified by this study fall under the Network Operations skill set; two each belong to Mission Systems and Network Infrastructure and one to Communications Planning & Implementation.

**Table 5-1 Top 10 KSA Critical Mean Values**

Top 10 KSA Critical Mean Values					Primary Training Source		
KSA Survey #	Core Knowledge Area	KSA Description	Mean Critical Value	Prior Knowledge	OJT	Tech Trng	Form Ed
KSA_2	Net Ops	Messaging System Operations (DMS, Outlook, etc...)	3.50	82%	91%	6%	4%
KSA_51	C&I	Perform Site Surveys	3.45	58%	10%	90%	0%
KSA_22	Net Inf	Principles of Bandwidth	3.35	71%	41%	30%	28%
KSAC_62	Mission Sys	Voice Network Systems Hardware and Concepts	3.30	59%	84%	13%	3%
KSA_26	Net Inf	Configuring Network Devices (e.g. Switches, Routers)	3.27	80%	51%	26%	23%
KSAC_4	Net Ops	Functions of Computer Components	3.26	94%	57%	8%	35%
KSA_9	Net Ops	COMSEC Accounting Practices	3.18	69%	88%	12%	0%
KSA_57	Mission Sys	Ground Radio Communications Hardware and Concepts	3.15	60%	82%	15%	3%
KSA_10	Net Ops	Processing COMSEC Materials	3.11	69%	88%	12%	0%
KSAC_20	Net Ops	Base Inter/Intranet Administration and Policies	3.08	59%	79%	21%	0%

Meanwhile 8 of the 10 lowest ranked KSAs belong to the Multi Media core skill group; only one KSA in this group had a critical mean value above 2.0, video teleconferencing.

**Table 5-2 Bottom 10 KSA Critical Mean Values**

<b>Bottom 10 KSA Critical Mean Values</b>					<b>Primary Training Source</b>		
<b>KSA Survey #</b>	<b>Core Knowledge Area</b>	<b>KSA Description</b>	<b>Mean Critical Value</b>	<b>Prior Knowledge</b>	OJT	Tech Trng	Form Ed
KSACRIT_39	Multi Media	Video Concepts and Hardware	1.73	30%	88%	8%	4%
KSACRIT_42	Multi Media	Maintenance and Storage of Multimedia Products	1.66	38%	82%	9%	9%
KSACRIT_40	Multi Media	Graphic Design Concepts and Hardware	1.63	39%	83%	8%	8%
KSACRIT_15	Net Ops	Application of Programming Languages	1.61	66%	26%	12%	62%
KSACRIT_44	Multi Media	Copyright and Reproduction Practices and Policies	1.59	41%	83%	9%	9%
KSACRIT_41	Multi Media	Audio/Video Editing Practices and Policies	1.58	38%	83%	9%	9%
KSACRIT_43	Multi Media	Inspection and Maintenance of Multimedia Equipment	1.55	29%	90%	10%	0%
KSACRIT_38	Multi Media	Photography Concepts and Hardware	1.53	29%	90%	5%	5%
KSACRIT_16	Net Ops	Digital Numbering Concepts (Binary, Hex, etc...)	1.52	73%	15%	24%	62%
KSACRIT_45	Multi Media	Media Production Facility Operations	1.45	32%	91%	9%	0%

Multi Media skill sets are virtually a non-existent need for 33S in deployed environments.

With the ever increasing emphasis on deployed operations one possibility for improvement may be to realign the garrison Multimedia flights to areas of responsibility more closely associated with their deployed mission. This would free up additional 33S's to be assigned to garrison missions more closely related to their deployed missions.

Also noteworthy is that of the top ten required KSAs only one, performing site surveys, attributes technical training as its primary source of acquiring this knowledge. This would suggest that technical training is not properly tailored to the needs of an expeditionary environment.

Another significant fact, two Network Operations KSAs, digital numbering concepts and programming languages, have the highest percentage as citing formal education as the primary source of acquiring this knowledge. These two skills also happen to be rated in the bottom 10 KSAs in mean critical value; this would seem to further supports H02 that there is not a significant difference in technical preparedness between 33S with or without communications related technical degrees.

### **Recommendations for Further Research**

41% of respondents in the sample population with less than two years experience have already deployed. With that being the case, gaining realistic deployment experience for new 33S officers as soon as possible upon entering the career field is vital. Further research needs to be conducted on how to accomplish this in quality and cost effective manner. Also, this study showed CBT usage of the sample population was fairly high. In addition, those using them are using them heavily; almost 80% of those reported completing 3 or more while over 50% complete 6 or more. Further research needs to be conducted on measuring the efficacy this form of training has on technical preparedness for deployment. This study revealed that multimedia skills and information management skills are of relatively little importance in deployed environments. Research needs to be conducted to ascertain the feasibility of realigning these services to areas of responsibility more in line with their deployed mission. Finally, the extreme diversity in the career field is a significant issue in terms of getting the right skills sets in the right locations. Unfortunately this study did not contain enough data to significantly correlate KSAs to specific UTCs. Further research needs to be conducted to better tailor skill sets to specific UTCs, AORs, duty positions, etc....

## **Final Thoughts**

During the literature review for this study it became quite clear expeditionary operations will remain a cornerstone of preserving peace and promoting democracy throughout the world now and for the foreseeable future. Military operations in the past, present, and future are highly dependant on the timely distribution of accurate information; the only thing really changing is the speed and means in which it is controlled, shared, and disseminated. As we proceed forward in the information age technology and the men and women responsible for it will play an ever increasing role in getting the right information in the right place at the right time. This study is important to the Air Force in the sense that it attempts to quantify how well prepared 33S officers are to do just that when and where it matters most.

## Appendix A: 33S Deployed Technical Knowledge, Skills, and Ability (KSA) Requirements Survey

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### 33SX Communications and Information Officer Deployed Technical Knowledge, Skills, and Ability (KSA) Requirements Survey

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1. This survey is intended to measure knowledge, skills, and abilities required of 33Sx officers upon arrival in a deployed environment. The collected data will be used as part of an AFIT research project and may subsequently be used to better prepare 33Sx officers for future deployments.
2. Your individual responses will in no way be attributed to you personally; all data gathered will be presented in aggregate form. No individual will be identified in any way.
3. The survey is estimated to take approximately 15-20 minutes; you can save it locally if necessary and return to it anytime. When completed click on the "Submit by Email" button at the beginning or end of the survey. Participation in this survey is completely voluntary. However, maximum participation is highly encouraged and will greatly contribute to the usefulness of the final product.
4. For questions or additional information pertaining to this survey please contact Captain Douglas Simmers, AFIT/ENV, at [Douglas.simmers@afit.edu](mailto:Douglas.simmers@afit.edu) Thank you in advance for your time.

**\*\*\* Technical Knowledge Skills, and Abilities Defined \*\*\***

For the purpose of this survey "technical" will be defined as any special knowledge, skills and/or abilities required to manage, operate, and/or maintain voice/data/video networks, mission systems, multi media operations, information management operations, or communications planning and implementation. This survey purposely excludes generic skill sets such as managerial and interpersonal skills which are common to all officer career fields.

#### Section A. Demographic Information

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1. Have you been deployed as a Communications Officer?  
 Yes (complete rest of survey)  
 No (**Complete question 2 & 3 and submit survey**)
  
2. If never deployed, enter your current rank? If previously deployed, enter your rank during your most recent deployment?  

<input type="radio"/> 2LT	<input type="radio"/> MAJ
<input type="radio"/> 1LT	<input type="radio"/> LT COL
<input type="radio"/> CAPT	<input type="radio"/> COL
  
3. How long have you been a Communications and Information Officer?  

<input type="radio"/> < 2yrs	<input type="radio"/> 4-8 yrs
<input type="radio"/> 2-4 yrs	<input type="radio"/> > 8 yrs

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4. What is/was your general area/level of responsibility during your most recent deployment?

Squadron Commander       Staff Officer

Flight Commander       Other - Please Specify \_\_\_\_\_

Executive Officer

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5. How many times have you been deployed as a 335x?

1       3

2       4 or more

---

6. What year did your most recent deployment begin?

Prior to 2000       2003-2004

2000-2002       2005 - Present

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7. To what extent do you feel you are/were technically prepared for your most recent deployment?

Extremely Well Prepared       Lacking Needed Skills

Well Prepared       Completely Unprepared

Adequate

---

8. To what extent do you feel technical skills are necessary for communications officers in a deployed environment?

Critical Need - cannot perform duties without them       Slight Need - nice to have occasionally

Significant Need - greatly enhances ability to perform duties       No Need - can complete duties with minimal technical knowledge, skill, or ability

Moderate Need - needed in certain situations

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9. What was your AFSC during your last deployment?

3351       3354  
 3353       Other, please specify \_\_\_\_\_

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10. If known, what UTC did you last deploy under for your most recent deployment? \_\_\_\_\_

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11. What was the overall mission of your last deployed location?

Base Operating Support       Host Nation Advisory  
 Province Reconstruction (PRT)       Other, please specify \_\_\_\_\_  
 Combat Operations

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12. Did your most recent deployment require any specialized technical training prior to your deploying?

Yes (please list course(s) below  
 No

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Section B: Technical Knowledge & Skills and Abilities Assessment (Used to gather data on technical skills required in AOR)

\* This section of the questionnaire describes technical knowledge and skills applicable to the 33S career field.

\*\* Respond to areas pertaining to only your most recent deployed experiences.

1. Mark the area(s) below which best describes your area(s) of responsibility during your last deployment.

<input type="radio"/> Network Operations
<input type="radio"/> Network Infrastructure
<input type="radio"/> Information Management
<input type="radio"/> Multimedia Operations
<input type="radio"/> Communications Planning and Implementation
<input type="radio"/> Mission Systems Operations
<input type="radio"/> Other, Please Specify: _____

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas  If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.					Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge? Choose the best answer			
		Limited Minor	Necessary Useful	Critical	Yes	No					
1a. Network Operations	1. Configure Workstations/Printers	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	2. Understand Messaging System Operations (DMS, Outlook, etc?)	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>

## Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.					Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge?			
		a. Part of my job, but of relatively minor importance	b. Limited Benefit	c. Somewhat Useful	d. Necessary, but not critical	e. Absolutely critical		a. Yes	b. No	a. On the job (OJT) experience (on this job or a previous job)	b. Formal technical training (BCOT, Training courses, etc?)
1a. Network Operations cont.	<p>If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.</p> <p>3. Networking Standards and Protocols Concepts</p> <p>4. Functions of Computer Components</p> <p>5. Equipment Control Officer (ECO) Responsibilities</p> <p>6. Use Network Administration Software (Windows Active Directory, SMS, etc...)</p> <p>7. Understand Security Patch Implementation, Hardware, Software, Policy, and Procedures</p> <p>8. Network/Boundary Protection Hardware, Software, and Concepts</p> <p>9. Understand COMSEC Accounting Practices</p> <p>10. COMSEC Material Processing Policy and Procedures</p> <p>11. Understand Firewalls and Intrusion Detection System Hardware and Concepts</p> <p>12. System Certification and Accreditation Processes</p> <p>13. Virtual Private Network Concepts and Practices</p> <p>14. File Server Configuration and Management Concepts</p>	Minor	Limited Useful	Necessary	Critical	Yes	No	OTJ	Tech Trng	Formal Ed	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		

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## Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.					Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge? Choose the best answer.				
		a. Part of my job, but of relatively minor importance	b. Limited Benefit	c. Somewhat Useful	d. Necessary, but not critical	e. Absolutely critical		a. Yes	b. No	a. On the job (OJT) experience (on this job or a previous job)	b. Formal technical training (BCOT, Training courses, etc?)	c. Formal Education (University, college, etc?)
1a. Network Operations cont.	<p>If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.</p>							Yes	No	OTJ	Tech Trng	Formal Ed
		Minor	Limited	Useful	Necessary	Critical						
	15. Application of Programming Languages	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	16. Digital Numbering Concepts (Binary, Hex, etc?)	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	17. Administer User Accounts (e.g. create, modify, delete, etc?)	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	18. Network Data Back Up and Recovery Systems and Concepts and Policies	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	19. Understand Integrated Communications Access Package (ICAP) Hardware, Implementation, and Concepts	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	20. Base Inter/Intranet Administration and Policies	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
1b. Network Infrastructure	21. Understanding of Network Topologies	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	22. Principles of Bandwidth	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	23. Understand Data Structures (bits, bytes, packets, etc?)	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	24. Wireless Technology Applications and Concepts	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	25. Evaluating Network Performance	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	
	26. Understand Network Device Concepts (e.g. Switches, Routers)	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	<input type="radio"/> e	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	

Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.					Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge? Choose the best answer			
		Minor	Limited	Useful	Necessary	Critical		Yes	No	OTJ	Tech Trng
1b. Network Infrastructure cont.	If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.	a. Part of my job, but of relatively minor importance b. Limited Benefit c. Somewhat Useful d. Necessary, but not critical e. Absolutely critical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	27. Use Network Analysis Tools (e.g. Cisco Works, HP Openview, etc?)	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	28. Subnetting Concepts	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	29. TCP/IP Concepts	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	30. Understand Integrated Communications Access Package (ICAP) Hardware, Implementation, and Concepts	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
1c. Information Management	31. Publications Management Policies	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	32. Records Management Principles	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	33. FOIA and Privacy Act Management	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	34. Base Information Transfer System Procedures	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	35. Postal Service Operations and Management	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
1d. Multimedia Operations	36. Video Teleconferencing	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	37. Alert Photography Principles/Policies	a b c d e	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

## Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.					Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge? Choose the best answer.			
		Minor	Limited Useful	Necessary	Critical	Yes		No	OTJ	Tech Trng	Formal Ed
1d. Multimedia Operations cont.	If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	38. Photography Concepts and Hardware	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	39. Video Concepts and Hardware	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	40. Graphic Design Concepts and Hardware	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	41. Audio/Video Editing Practices and Policies	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	42. Maintenance and Storage of Multimedia Products	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	43. Inspection and Maintenance of Multimedia Equipment	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	44. Copyright and Reproduction Practices and Policies	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	45. Media Production Facility Operations	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
1e. Communications Planning	46. DoD Architecture Standards	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	47. C4ISR Infrastructure Planning Systems (CIPS)	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	48. Project Management Documentation, Policies and Procedures	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>
	49. Funded/Unfunded Requirements Process	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>	d <input type="radio"/>	e <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	a <input type="radio"/>	b <input type="radio"/>	c <input type="radio"/>

## Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.	Did you possess this knowledge/skill PRIOR to your deployment?	If yes, how did you acquire this knowledge? Choose the best answer								
				a. Part of my job, but of relatively minor importance	b. Limited Benefit	c. Somewhat Useful	d. Necessary, but not critical	e. Absolutely critical	a. On the job (OJT) experience (on this job or a previous job)	b. Formal technical training (BCOT, Training courses, etc?)	c. Formal Education (University, college, etc?)	
1e. Communications Planning cont.	<p>If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.</p>			Limited Minor	Useful	Necessary	Critical	Yes	No	OJT	Tech Trng	Formal Ed
				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	50. System Certification and Accreditation Process	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	51. Perform Site Surveys	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1f. Mission Systems Operations	52. Maintenance Management Processes	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	53. Personal Wireless Communications Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	54. Ground Radar Systems Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	55. Satellite Access Requests Policy and Procedures	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	56. Frequency Spectrum Management	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	57. Ground Radio Communications Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	58. Cable and Antenna Systems Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	59. Satellite Wideband Telemetry Systems Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	60. Visual Imagery and Intrusion Detection Systems	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	61. ATCALS/METNAV Hardware and Concepts	a b c d e		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Attachment 1

General KNOWLEDGE and SKILL Categories	KNOWLEDGE and OCCUPATIONAL SKILL Sub Areas	How CRITICAL is having this knowledge or skill to accomplishing the main mission of your job? Choose the one best answer.	Did you possess this knowledge/skill PRIOR to your deployment?	How did you acquire this knowledge? Choose the best answer.	
				a. On the job (OJT) experience (on this job or a previous job)	b. Formal technical training (BCOT, Training courses, etc?)
1f. Mission Systems Operations cont.	If the knowledge, skill, and or ability below is/was required during your last deployment rate the sub item using the scales to the right of that sub item; if not required, go to the next sub item.	a. Part of my job, but of relatively minor importance b. Limited Benefit c. Somewhat Useful d. Necessary, but not critical e. Absolutely critical		a. Yes b. No	OTJ Tech Trng Formal Ed
	62. Voice Network Systems Hardware and Concepts	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d <input type="radio"/> e	<input type="radio"/> a <input type="radio"/> b	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c	
	63. Understand Integrated Communications Access Package (ICAP) Hardware, Implementation, and Concepts	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d <input type="radio"/> e	<input type="radio"/> a <input type="radio"/> b	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c	
64. Basic Electronic Principles (e.g. opens, shorts, modulation, etc?)	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d <input type="radio"/> e	<input type="radio"/> a <input type="radio"/> b	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c		

Use this area to identify any additional technical knowledge, skills, and/or abilities you feel were pertinent to your deployment experience. Also, feel free to elaborate hindsight on how technically prepared you felt you were for deployment, how necessary you feel technical knowledge, skills, and abilities are to a successful deployment, and how you primarily acquired the necessary skill sets (e.g. AFCA supplemental courses, OJT, combination of both, etc..).

---

**Section C . Education and Training (The following questions are used to correlate technical preparedness with education and training)**

---

1. Do you possess a technical based communications degree (e.g computer science, computer programming, etc?)?

Yes  
 No

---

2. Have you attended an initial Communications Officer Training Course (e.g. BCOT, ECOT, etc?)

Yes  
 No

---

---

3. Have you attended an advanced Communications Officer Training (e.g. ACOT, CBMC, etc?)

Yes  
 No

---

4. Have you attended additional commercial and/or DoD technical based communications training courses since your commissioning?

Yes (complete question 5)  
 No (go to question 6)

---

5. How many have you attended?

1                            3  
 2                            4 or more

---

6. Have you taken commercial and/or DoD provided computer based training (CBT) courses to increase communications technical knowledge, skills, and abilities?

Yes (complete question 7)  
 No (you are done, please submit survey)

---

7. How many CBTs have you completed

1-2                            5-6  
 3-4                            > 6

---

You are done! Please submit survey using button below. Thank you for participation. Results of this study will be available through the Air Force Institute of Technology Technical Library upon publication.

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**Submit by Email**

## Appendix B: KSAs 1-64 Critical Mean Values

# of Times Selected = The number of respondents (maximum 77) who identified the respective KSA as being at least of minor importance in their deployed environment.

Min = Minimum score received by at least one respondent on the five-point measurement instrument.

Max = Maximum score received by at least one respondent on the five-point measurement instrument.

Mean = Average score received on the five-point measurement instrument.

KSA Survey #	Core Knowledge Area	KSA Description	# of Times Selected (Max 77)	Min	Max	Mean
KSA_1	Net Ops	Configure Workstations/Printers	59	1	5	2.68
KSA_2	Net Ops	Messaging System Operations (DMS, Outlook, etc...)	58	1	5	3.50
KSA_3	Net Ops	Networking Standards and Protocols Concepts	58	1	5	2.93
KSA_4	Net Ops	Functions of Computer Components	57	1	5	3.26
KSA_5	Net Ops	Equipment Control Officer Responsibilities	53	1	5	2.57
KSA_6	Net Ops	Use Network Administration Software (Windows Active Directory, SMS, etc...)	50	1	5	2.80
KSA_7	Net Ops	Security Patch Implementation Software and Policies	54	1	5	3.06
KSA_8	Net Ops	Network/Boundary Protection Hardware, Software, and Concepts	53	1	5	2.92
KSA_9	Net Ops	COMSEC Accounting Practices	56	1	5	3.18
KSA_10	Net Ops	Processing COMSEC Materials	56	1	5	3.11
KSA_11	Net Ops	Firewalls and Intrusion Detection Systems and Concepts	52	1	5	3.04
KSA_12	Net Ops	System Certification and Accreditation Process	54	1	5	2.76
KSA_13	Net Ops	Virtual Private Network Concepts	48	1	5	2.52
KSA_14	Net Ops	File Server Configuration and Management	50	1	5	2.94
KSA_15	Net Ops	Application of Programming Languages	44	1	4	1.61
KSA_16	Net Ops	Digital Numbering Concepts (Binary, Hex, etc...)	44	1	4	1.52

KSA Survey #	Core Knowledge Area	KSA Description	# of Times Selected (Max 77)	Min	Max	Mean
KSA_17	Net Ops	Administer User Accounts (e.g. create, modify, delete, etc...)	49	1	5	3.04
KSA_18	Net Ops	Network Data Back Up and Recovery Systems and Concepts	48	1	5	2.92
KSA_19	Net Ops	Integrated Communications Access Package Hardware and Concepts	43	1	5	2.35
KSA_20	Net Ops	Base Inter/Intranet Administration and Policies	51	1	5	3.08
KSA_21	Net Inf	Understanding of Network Topologies	53	1	5	3.08
KSA_22	Net Inf	Principles of Bandwidth	54	1	5	3.35
KSA_23	Net Inf	Understand Data Structures (bits, bytes, packets, etc...)	49	1	5	2.51
KSA_24	Net Inf	Wireless Technology Applications and Concepts	48	1	5	2.79
KSA_25	Net Inf	Evaluating Network Performance	51	1	5	3.08
KSA_26	Net Inf	Configuring Network Devices (e.g. Switches, Routers)	52	1	5	3.27
KSA_27	Net Inf	Use Network Analysis Tools (e.g. Cisco Works, HP Openview, etc...)	49	1	5	2.80
KSA_28	Net Inf	Subnetting Concepts	47	1	5	2.57
KSA_29	Net Inf	TCP/IP Concepts	49	1	5	2.69
KSA_30	Net Inf	Integrated Communications Access Package Hardware and Concepts	40	1	5	2.30
KSA_31	Info Mgmt	Publications Management Policies	44	1	5	2.07
KSA_32	Info Mgmt	Records Management Principles	46	1	5	2.17
KSA_33	Info Mgmt	FOIA and Privacy Act Management	44	1	5	2.25
KSA_34	Info Mgmt	Base Information Transfer System Procedures	42	1	4	1.76
KSA_35	Info Mgmt	Postal Service Operations and Management	45	1	5	2.11
KSA_36	Multi Media	Video Teleconferencing	43	1	5	2.93
KSA_37	Multi Media	Alert Photography Principles/Policies	40	1	5	1.98
KSA_38	Multi Media	Photography Concepts and Hardware	38	1	5	1.53
KSA_39	Multi Media	Video Concepts and Hardware	40	1	5	1.73
KSA_40	Multi Media	Graphic Design Concepts and Hardware	38	1	5	1.63
KSA_41	Multi Media	Audio/Video Editing Practices and Policies	38	1	5	1.58

KSA Survey #	Core Knowledge Area	KSA Description	# of Times Selected (Max 77)	Min	Max	Mean
KSA_42	Multi Media	Maintenance and Storage of Multimedia Products	38	1	5	1.66
KSA_43	Multi Media	Inspection and Maintenance of Multimedia Equipment	38	1	5	1.55
KSA_44	Multi Media	Copyright and Reproduction Practices and Policies	39	1	5	1.59
KSA_45	Multi Media	Media Production Facility Operations	38	1	4	1.45
KSA_46	Comm P&I	DoD Architecture Standards	49	1	5	2.67
KSA_47	Comm P&I	C4ISR Infrastructure Planning Systems (CIPS)	47	1	5	2.40
KSA_48	Comm P&I	Project Management Documentation, Policies and Procedures	47	1	5	2.68
KSA_49	Comm P&I	Funded/Unfunded Requirements Process	51	1	5	2.47
KSA_50	Comm P&I	System Certification and Accreditation Process	51	1	5	2.61
KSA_51	Comm P&I	Perform Site Surveys	53	1	5	3.45
KSA_52	Mission Sys	Maintenance Management Processes	41	1	5	2.93
KSA_53	Mission Sys	Personal Wireless Communications Hardware and Concepts	42	1	5	2.64
KSA_54	Mission Sys	Ground Radar Systems Hardware and Concepts	41	1	5	2.49
KSA_55	Mission Sys	Satellite Access Requests Policy and Procedures	41	1	5	2.78
KSA_56	Mission Sys	Frequency Spectrum Management	46	1	5	2.96
KSA_57	Mission Sys	Ground Radio Communications Hardware and Concepts	46	1	5	3.15
KSA_58	Mission Sys	Cable and Antenna Systems Hardware and Concepts	46	1	5	3.02
KSA_59	Mission Sys	Satellite Wideband Telemetry Systems Hardware and Concepts	43	1	5	2.77
KSA_60	Mission Sys	Visual Imagery and Intrusion Detection Systems	35	1	5	1.83
KSA_61	Mission Sys	ATCALS Hardware and Concepts	38	1	5	2.21
KSA_62	Mission Sys	Voice Network Systems Hardware and Concepts	43	1	5	3.30
KSA_63	Mission Sys	Integrated Communications Access Package Hardware and Concepts	39	1	5	2.33
KSA_64	Mission Sys	Basic Electronic Principles (e.g. opens, shorts, modulation, etc...)	43	1	5	2.79

Appendix C: Survey Section B, Question 2, Additional Comments

<b>Survey Response Number</b>	<b>Section B_Question 2_KSA Additional Comments</b>
Deployed Requirements Survey_data65.xml	I was extremely lucky to have SNCOs and NCOs that were very qualified and willing to teach me the information needed to execute my duties as Flight Commander, Mission Systems and SATCOM.
Deployed Requirements Survey_data83.xml	While my formal training did briefly cover most of the concepts/items I needed on my deployment, I truly learned the most while at my deployed location using/being responsible for the equipment. Since Comm is such a diverse field to be into, I realize there's no easy way to cover it all in formal training and like how as a Comm Officer most of my training takes place at my unit "on the job." This helps keep me flexible and enables me to quickly adapt to an ever changing environment. My Combat Comm experiences were immensely useful on my deployment as I was already familiar with: the TPN-19, the TACAN, radios, and combat/safety training in hazardous environments. The areas that I wasn't so familiar with were telephone/data infrastructure, maintenance reporting, and quality assurance.
Deployed Requirements Survey_data38.xml	I had about 4-5 months experience as an Executive Officer prior to being deployed and that was what prepared me to best. Although there were many things I had to learn OJT (i.e. you do whatever is necessary for the mission/boss to be successful). I didn't need a lot of technical skills to function but when I did I had the experts who deployed to do those functions assist.
Deployed Requirements Survey_data20.xml	I believe all comm. officers before an assignment should take a supplemental course especially such units as Combat Communications Units.
Deployed Requirements Survey_data43.xml	I was not technically prepared for my deployment. I didn't learn any of the knowledge I needed before I entered active duty or in any of my schools/training. I deployed under a different job than I had worked for the last year on active duty, so I had no experience.
Deployed Requirements Survey_data80.xml	My specific job required high level knowledge of Server software and infrastructure devices. Understanding how network devices interacted in order to create and identify good network configurations and be able to explain it to others. Most of my training was accomplished through commercial training, but some was done through in-house classes at the AFCA. I also received OJT from our contractors. From interacting with other officers while deployed, it is important that they know what each piece of equipment does (not necessarily how it works) in order to adequately manage their team. Many did not know what was going on with their network. "Know just enough to be dangerous."
Deployed Requirements Survey_data122.xml	The tasks I encountered while I was deployed were very straight forward and when looked at logically were easy to find solutions for.
Deployed Requirements Survey_data58.xml	I deployed before attending BCOT, so I was not prepared at all for any of the responsibilities I would face. However, deployment provided an excellent OJT environment with a lack of bureaucracy to impede me from learning what I wanted to learn about the systems I was responsible for. When I finally did attend BCOT, it was a survey course at best which introduced us as new students to the vocabulary of the Air Force and the C&I world, but without actually teaching us anything about the processes and principles involved in making the C&I world function. I have not used any skills or knowledge gained from BCOT in any of my jobs.

<b>Survey Response Number</b>	<b>Section B_Question 2_KSA Additional Comments</b>
Deployed Requirements Survey_data60.xml	A realistic description of required skills BEFORE deployment would have helped. I learned how to configure a "green box" KG-600 or something, but only cadre needed this skill. I should have learned advanced Exchange Server techniques.
Deployed Requirements Survey_data33.xml	Physical and transport layers of the stack! Even in the plans shop, if I didn't know both the physical infrastructure side (fiber/copper) and the actual TCP/IP routing, I would have been delayed many times as technicians stalled out.
Deployed Requirements Survey_data106.xml	Tech prep included site visit before deployment to Beale AFB for a few days for tech orientation to the mission I was supporting. Insight into structure of TPED (transmission, processing, exploitation, dissemination) intelligence data was essential to my ability to command the unit and make critical decision affecting site mission readiness. E.g., some repairs were not exactly per T.O., but saved 2 weeks downtime and provided mission continuance. I did not need to fully understand the tech aspects of the mission, but the ability to do so aided in my decision-making processes as site commander.
Deployed Requirements Survey_data4.xml	We built a bare base in three weeks. Understanding the mission requirements was key to overwhelming success. Relation of the mission to our capability is what the war-fighter wants.
Deployed Requirements Survey_data28.xml	As a comm planner you have to understand how ECES does business as well. Understanding their processes makes your job a lot easier.  Contracting knowledge is also critical. Many of our new programs are installed via DoD contractors.  Network design...critical to ensuring you are making the best decisions that provide for future expansion of base mission.
Deployed Requirements Survey_data102.xml	Having a sound understanding of the technical principles key to operations is important as there is little time to get familiar on an issue once deployed. Of course, nothing beats practical experience. It's not reasonable to expect someone to have exposure in every subject matter but a broad base of knowledge is necessary.
Deployed Requirements Survey_data103.xml	I feel what prepared me most for my deployment was my Engineering Installation (E&I) background.
Deployed Requirements Survey_data110.xml	I was technically prepared only because of OJT in my in-garrison job I received from actively seeking out the information to lead a bare base communications infrastructure set up. BCOT gave me ZERO skills, and I gained some basic knowledge from the TDC/ICAP Systems Planner Course (good for basic foundation). If I had not been in an in-garrison job leading a Deployable Communication Flight, with ready access and training on deployable comm systems, I would have been ill-prepared and a hindrance to mission accomplishment. Luckily I was able to learn the necessary skills by OJT and trial-and-error by leading my Deployable Comm Flight while in-garrison prior to our multiple deployments. Broad technical understanding is required in the deployed environment because the "book" answers simply do not cut it when deployed for the simple reason that when things break or go wrong, you have to find another way to continue comm support. If the comm CGO does not truly understand the various comm systems, they cannot provide proper guidance/support to the comm mission areas nor to the leadership who expect results in a deployed environment without issues/questions.

<b>Survey Response Number</b>	<b>Section B_Question 2_KSA Additional Comments</b>
Deployed Requirements Survey_data86.xml	Need to have info on following areas prior to deploying in SCM: CA/CRL accounts, IMDS, LMRs, Giant Voice, TSSRs, AFN, UPS, Generators, ECUs, telephone switches, copper/fiber.
Deployed Requirements Survey_data48.xml	- Microsoft FrontPage training to manage webpage design and maintenance. CENTCOM provided an introductory course after arriving on station. I had a basic knowledge of the software from personal experiences, no formal training. - Microsoft Access database
Deployed Requirements Survey_data88.xml	AF made two critical mistakes in the 90s: making officers generalists instead of specialists and broadening the career field. This makes it nearly impossible for one person to be proficient across all areas of the career field. I felt technically unprepared for this deployment but somehow managed to pick-up what I needed while in the hot seat. This is a terrible position to put our troops in and an even worse condition to force on the deployed units who depend on us. I think the AF is doing a better job with pre-deployment training, but it was non-existent at that time.
Deployed Requirements Survey_data91.xml	Being deployed to CENTCOM HQ (summer '06), it was extremely important to understand the terminology of Joint/Combined Forces Commands. Working with the other services was much easier knowing this information. This information is easily attained (from a knowledge perspective) in the Warfighting Integration course at Keesler AFB and the AOC Fundamentals course at Hurlburt Field. I was technically prepared for this deployment due to my prior duties as an Instructor at Keesler. I had already taught a multitude of the information that was needed for my deployment. I was also deployed to PSAB, Saudi Arabia (summer '02) as a Comm Plans officer. This was prior to the knowledge I attained as an instructor. It was an extremely difficult deployment due to the limited knowledge I had as a brand new Capt with very limited deployed comm knowledge. The survey results above are solely on the summer '06 deployment.
Deployed Requirements Survey_data69.xml	Command structure differences; I had just left Central Command so I was very familiar with the AOR. If I had not had the Central Command background I would have been a little lost.
Deployed Requirements Survey_data45.xml	RF engineering, evaluating radio networks, and structural engineering were pertinent skills that I wish I had more practice with prior to the deployment
Deployed Requirements Survey_data6.xml	The majority of my deployment was spent as a Work Group Manager for the CENCOM Coalition Village. Where I would set up computers, email accounts, and other communication devices for the 300 Coalition officers. It required in-depth knowledge of computer systems and the workings of Microsoft Outlook. The position could easily have been better filled with a trained E-4 or E-5. However, because of the cultural aspect of some coalition countries, it required an O-3 or O-4 to deal with the dignitaries. 80% of the knowledge required for this position I have obtained from working with my own computers systems at home. The other 20% I had picked up from the WGMs at my home station.  I did deploy to Qatar for 35 days as the Forward CENTCOM HQ as the Coalition Coordination Center representative. There I tracked the 35K coalition troop in OEF, OIF, and Horn of Africa for the CENTCOM CC. The skills necessary to fill this Staff Officer position was gain on the fly with lots of help for the other officers performing similar duties.
Deployed Requirements Survey_data34.xml	Knowledge of deployed systems/interfacing, some electronics background helpful, waveforms, signaling,

<b>Survey Response Number</b>	<b>Section B_Question 2_KSA Additional Comments</b>
Deployed Requirements Survey_data35.xml	As an executive officer, courses on writing, time management and organization would have prepared me more than the stuff I learned in BCOT. While BCOT was a very interesting course, I have yet to actually use any of it. I acquired most of the skills I needed as an executive officer by actually being an executive officer for the maintenance group at my base. I knew what skills were needed, understood the AFIs that applied to the job and was organized properly because I had already gone through the pain of learning the job the hard way.
Deployed Requirements Survey_data32.xml	Executive Officers need to have good understanding of MS Office Suite products (i.e., Outlook, Word, Power Point, Publisher, etc.). It's also beneficial if they've worked Protocol before and have dealt with Communication Planning and Implementation (oftentimes, they coordinate finance issues with Contracting and have dialog with Civil Engineering on a daily basis). Moreover, I've submitted form 3215s to order various comm items (i.e., Iridiums/Satellite phones). I've also had to manage the OPSEC program, Vehicle Control and Transportation Management Office responsibilities. Occasionally, I've coordinated VTCs and site addresses; along with, Voice Over SIPRNET phones and call manager configuration.
Deployed Requirements Survey_data8.xml	Communications Officers need to have a clear understanding of wide spectrum of real-world communications issues (especially in the deployed environment) and a working knowledge of basic and advanced communications means. I was prior enlisted (2E2X1) and this gave me the background I needed but, some young officer may not be as prepared as we might want... Thank you.
Deployed Requirements Survey_data70.xml	For this particular deployment, my technical knowledge all came from OJT prior to the deployment. As this was also a NATO deployment, I was outside the typical USAF realm and required specific skills which were non-trainable, i.e. how to deal with foreign military members and training them in proper security procedures when their nation does not put the same emphasis on it.
Deployed Requirements Survey_data55.xml	I deployed under a unique UTC that has never been called to deploy to SWA (ever). This type of job was normally performed by civilian engineers in our unit. Our team went through a crash course training weeks prior to departure. Since it was the first deployment for that UTC, we had no basis on what to expect (to perform in that type of condition), what we need to make it a successful deployment. However, the team was able perform well with the minimal training we received. There are times when we were asked to perform tasks that were outside the scope of the UTC MISCAP. In those cases, we depended on our home base reach back support.
Deployed Requirements Survey_data109.xml	Knowledge of Air Force long-haul communications does not adequately prepare you for the tactical communications systems the Army / Marines use that is often held together with wire and sandbags! More tactical communications knowledge is needed and NOT just Air Force, but all systems in use! Frequency / Satellite management was also something I would have liked more knowledge of prior to arrival in the AOR.

Survey Response Number	Section B_Question 2_KSA Additional Comments
Deployed Requirements Survey_data16.xml	<p>My last deployment was pretty focused in scope and probably a bad example of what I needed to know to be effective in the field. My first two were much more challenging. While technical training is important from a background standpoint, there is simply too much technical stuff out there for one person to be proficient in everything you will be hit with and in my case researching, learning just enough and implementing was a standard routine. The things that helped me were a solid fundamentals background (modulation, signal flow, troubleshooting skills, a basic overview of major components/systems and what they do), a knowledge of resources available for help (google, AFIs, governing guidance, &amp; who does what on the A-staff, wing, CAOC, &amp; combined/joint force structure in AOR), knowing who you had to coordinate with and finally problem solving skills. There is very little that I have used and applied in the Air Force that has come from a formal or deliberate training program, but rather through OJT or self study while trying to tackle a given problem. The more problems tackled and the greater the reach in terms of coordination, staffing, finding the SMEs, etc. the more useful the knowledge will be for you later... I have just had a good variety.</p> <p>Another observation that may need to be looked at isn't necessarily trying to assess what technical training folks need to handle all the things that are thrown at them, but to focus rather on what can be accomplished during deliberate planning that can preclude the number of heroes you need in the field.</p>
Deployed Requirements Survey_data117.xml	<p>It would be nice to have more courses dealing with either deployed comm or stationary satcom. That's all I dealt with at Al Udeid and deployed was my first exposure.</p>
Deployed Requirements Survey_data98.xml	<p>Telecommunications principles, VoIP in deployed environment, DISA TSOs, Configuration Management principles and configuration management tools. Communications planning principles for receiving inbound units into established network in deployed environment.</p> <p>I think I was technically prepared on my deployment because I had been exposed on the job to many of the skills needed. Many of the skills I did have to learn, however came painfully. Formal training on new and upcoming technologies has been lacking. The civilian contractor counterparts I work with have a more solid hands-on background. The enlisted force I have worked with are sent to regular training (as they should) within their field. The breadth of communications for military officers including AF, Army, and Navy branches often puts us in the position that we often fall behind in our ability to understand and employ the technology we are expected to make decisions upon. As a result, we tend to be more risk adverse when we come to implementing new technologies than I would say I see in the commercial world.</p> <p>My current deployment has me working with a large contractor force implementing the whole range of communications except for LMRs and airfield systems in Baghdad. Although, I don't believe I will know and understand everything I need in this vast career field, certain in depth areas of expertise gained by formal schooling or certifications would have been very useful.</p>

<b>Survey Response Number</b>	<b>Section B_Question 2_KSA Additional Comments</b>
Deployed Requirements Survey_data5.xml	Other than BCOT and ACOT, everything else has been OJT and being at the right place at the right time. Additionally I always had a great team to work with and that is the main reason as to why things went well most of the time
Deployed Requirements Survey_data104.xml	Was J6 at JTF task force as LtC. Felt my background and experience was more than enough for job... however, have always felt that AF does not do enough training for 33S officers, and specifically technical training to keep abreast of IT. Hard to find time and money to go to various tech refresh classes. In my view, best if AETC could built more "technical training" into ACOT course, expand course, discuss to some depth (but not too much) issues such as data networks, IP protocol, ports and protocols, firewalls, switches, routers, VPNs, voice networks, voice over IP, etc., etc., etc.
Deployed Requirements Survey_data66.xml	Did not really act as Frequency management chief during the deployment. Had 1-2 week notice (volunteered) for a 365-day TDY to Baghdad - staff work (deputy in operations) did not require too much technical work.

Appendix D: Individual Mean KSA Critical Values by Core Skill Group

Respondent Mean Criticality Values by Core Knowledge Area Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical							Primary Area(s) of Responsibility During Last Deployment												
<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						<u>Net Ops</u>	<u>Net Inf</u>	<u>Info Mgmt</u>	<u>Multi Media</u>	<u>Comm I&amp;P</u>	<u>Mission Sys</u>	<u>Mission Sys</u>	<u>Comm P&amp;I</u>	<u>Multi Media</u>	<u>Info Mgmt</u>	<u>Other</u>	<u>Other Comments</u>	
	<u>Net Ops</u>	<u>Net Inf</u>	<u>Info Mgmt</u>	<u>Multi Media</u>	<u>Comm I&amp;P</u>	<u>Mission Sys</u>													
Deployed Requirements Survey_data1.xml	2.00	2.00	1.20	1.60	2.50	2.46							X		X			Executive Officer duties	
Deployed Requirements Survey_data10.xml	1.60					2.83								X					
Deployed Requirements Survey_data100.xml	2.75	1.90	1.40	1.60	1.00	1.15	X						X			X	Client Support Administration		
Deployed Requirements Survey_data101.xml	1.33																Executive officer		
Deployed Requirements Survey_data102.xml	3.18	3.33		3.00	2.75	3.00	X	X											
Deployed Requirements Survey_data103.xml	2.30	3.40	3.20	1.50	2.17	2.38								X					
Deployed Requirements Survey_data104.xml	2.92				3.00	3.00	X	X	X				X	X					
Deployed Requirements Survey_data105.xml						1.69										X			
Deployed Requirements Survey_data106.xml	3.15	3.00	3.40	2.00	2.67	2.92	X	X	X				X	X					
Deployed Requirements Survey_data108.xml	2.75	2.40	1.00	1.30	1.50	1.31	X									X			
Deployed Requirements Survey_data109.xml	2.85	3.80	1.60	2.10	3.00	2.31	X	X					X	X					
Deployed Requirements Survey_data110.xml	4.20	4.70	1.80	1.00	3.50	4.46	X	X	X				X	X					

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment						
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Other	Other_Comments
Deployed Requirements Survey_data116.xml	1.00	1.00	1.00				X	X	X				
Deployed Requirements Survey_data117.xml	2.25	2.00	1.00	1.20	2.50	2.17		X					
Deployed Requirements Survey_data118.xml	2.90	2.90	1.00	1.00	2.17	2.31	X	X			X		
Deployed Requirements Survey_data120.xml	2.55	1.00	3.20	1.50	1.00	2.15	X	X	X				
Deployed Requirements Survey_data121.xml	2.58	3.00					X	X	X				
Deployed Requirements Survey_data122.xml	2.05	1.60	1.20	1.30	1.50	2.46					X		
Deployed Requirements Survey_data16.xml	4.00	4.14			4.50	4.00	X	X	X	X	X		
Deployed Requirements Survey_data2.xml	3.10	2.30	2.20	2.00	1.50	1.00						X	Wing Exec
Deployed Requirements Survey_data20.xml	4.35	4.80	4.00	1.60	5.00	4.46	X	X		X	X		
Deployed Requirements Survey_data26.xml	4.00	2.67		1.00	4.33	3.75		X		X			
Deployed Requirements Survey_data28.xml					4.40						X		
Deployed Requirements Survey_data31.xml		1.00			2.40	2.15		X		X	X		
Deployed Requirements Survey_data32.xml	2.40	1.50	3.20	3.10	1.00	1.23	X		X	X			

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment						
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Other	Other_Comments
Deployed Requirements Survey_data33.xml	3.05	2.40	2.00	2.00	4.83						X		
Deployed Requirements Survey_data34.xml	3.50	4.10	1.20	1.60	3.00	3.31					X X		
Deployed Requirements Survey_data35.xml	1.60		2.40	1.20			X		X X			X Executive Officer	
Deployed Requirements Survey_data36.xml	3.10	2.75	4.00				X	X	X				
Deployed Requirements Survey_data37.xml					1.00	1.00						X Additional Duty: Motorola radios, cell phones	
Deployed Requirements Survey_data38.xml	4.00		2.50									X Executive officer at Grp level	
Deployed Requirements Survey_data39.xml	1.50				1.25	3.00	X			X X			
Deployed Requirements Survey_data4.xml	2.65	3.20	2.00	2.90	2.33	3.15	X	X		X X			
Deployed Requirements Survey_data43.xml	4.08	4.14					X	X					
Deployed Requirements Survey_data44.xml										X			
Deployed Requirements Survey_data45.xml	4.00	3.89			5.00		X	X			X		
Deployed Requirements Survey_data48.xml	3.20						X					X Database and Webpage Mgt	

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment						
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Other	Other_Comments
Deployed Requirements Survey_data5.xml	3.00	2.40	3.80	2.40	2.50	3.08	X	X	X		X	X	
Deployed Requirements Survey_data50.xml	2.33	2.75			2.00			X			X	X	
Deployed Requirements Survey_data52.xml			2.20						X				
Deployed Requirements Survey_data53.xml	4.33	4.00					X	X					
Deployed Requirements Survey_data54.xml	2.50	2.60	2.00	1.90	3.00	2.46							
Deployed Requirements Survey_data55.xml	1.20	1.50	1.00	1.00	1.33	2.77						X	Radio Direction Finding
Deployed Requirements Survey_data57.xml					2.83					X			
Deployed Requirements Survey_data58.xml	3.74	4.33	3.60	1.20	4.17	4.42	X	X	X	X	X		
Deployed Requirements Survey_data59.xml	3.95	3.50	4.00				X	X					
Deployed Requirements Survey_data6.xml	3.20						X						Staff Officer: Briefed CENTCOM CC on coalition issues
Deployed Requirements Survey_data60.xml	1.95	2.00	1.20	1.00	1.00	1.00	X						
Deployed Requirements Survey_data65.xml	3.00	4.00	3.00	4.00	4.00	4.90				X	X		SATCOM

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment							
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Mission Sys	Other	Other_Comments
Deployed Requirements Survey_data66.xml	1.00	1.00	1.00	1.00	1.00	1.00							X	Deputy Chief, CIS Operations for MNF-I - in a generalized way, covered all
Deployed Requirements Survey_data67.xml													X	Air Ops
Deployed Requirements Survey_data68.xml	4.36	4.63			5.00		X							
Deployed Requirements Survey_data69.xml	3.50	3.20	1.00	1.30	3.00	3.15					X			
Deployed Requirements Survey_data7.xml	1.40		3.00							X				
Deployed Requirements Survey_data70.xml			1.60							X			X	Information Security
Deployed Requirements Survey_data71.xml	3.05	4.80	1.80	2.60	1.83	4.15	X	X	X	X	X	X		
Deployed Requirements Survey_data72.xml	2.65	2.22	1.00	1.80	1.00		X	X	X	X	X			
Deployed Requirements Survey_data74.xml	4.00	3.40	1.80	1.40	4.50		X							
Deployed Requirements Survey_data77.xml	3.15	2.80	1.00	2.50			X	X	X		X		X	ADPE, IA, COMSEC
Deployed Requirements Survey_data8.xml	3.45	3.30	4.00	3.40	4.00	3.62							X	Executive Officer supporting EMSG/CC
Deployed Requirements Survey_data80.xml	3.53	3.11			4.20		X		X					

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment						
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Other	Other_Comments
Deployed Requirements Survey_data81.xml	3.30	2.90	1.20	1.20	3.00	3.62	X						
Deployed Requirements Survey_data82.xml	2.47	1.00	1.40	1.00	1.50	2.00	X	X	X		X		
Deployed Requirements Survey_data83.xml	3.17	4.00			4.00	4.22		X			X	X	Airfield Operations
Deployed Requirements Survey_data85.xml						2.10						X	
Deployed Requirements Survey_data86.xml	1.55	1.00	1.00	1.00	1.17	3.77						X	
Deployed Requirements Survey_data87.xml	3.00	3.00	3.00	3.00	3.00	3.00	X	X	X	X	X	X	
Deployed Requirements Survey_data88.xml	2.47	4.50		3.00	3.67	4.33	X	X			X	X	
Deployed Requirements Survey_data89.xml	3.10	4.00	3.00	2.80	3.17	3.54	X	X	X	X	X	X	
Deployed Requirements Survey_data90.xml	3.90	4.20	1.40	1.00	2.33	1.31	X						
Deployed Requirements Survey_data91.xml	3.43		3.00		3.50	3.00	X				X		
Deployed Requirements Survey_data93.xml	4.00		4.60	4.40						X		X	Postal OPS, Information Services
Deployed Requirements Survey_data94.xml	3.05	2.60	1.60	2.30	3.50	3.15	X				X		
Deployed Requirements Survey_data96.xml	1.40	1.00	1.00	1.20	2.33	2.69				X	X		

**Respondent Mean Criticality Values by Core Knowledge Area**

Level of Importance: 1-Minor, 2-Limited Benefit, 3-Useful, 4-Necessary, 5-Critical

<u>Survey Response Number</u>	Core Skill Sets Used During Last Deployment						Primary Area(s) of Responsibility During Last Deployment						
	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm I&P	Mission Sys	Net Ops	Net Inf	Info Mgmt	Multi Media	Comm P&I	Other	Other_Comments
Deployed Requirements Survey_data97.xml	2.60	3.90	2.00	1.30	4.00	2.23	X	X	X		X	X	
Deployed Requirements Survey_data98.xml	2.85	3.00		2.50	3.17	3.20	X	X		X	X		
Deployed Requirements Survey_data99.xml	2.40	1.00			4.00	4.50							Ground Radio Support (Operations / Infrastructure)

## Bibliography

33S Communications and Information Officer Career Field Education and Training Plan. HQ USAF. 24 April 2006

Air Force Communications Agency. Information Training Management Website,  
<https://private.afca.af.mil/seminars/> (Accessed 7 January 2007)

Air Force Instruction 10-403. Deployment Planning and Execution. HQ AF/ILXX 5 August 2005

Davis, Richard G. Anatomy of Reform: The Expeditionary Aerospace Force, Air Force Historical Studies Office, Washington DC, 2003

Fisher, Greg H. Air Force Core Competency: Global Attack What it Means to Operational Commanders, Naval War College, Newport RI, February 1997

Fuch R., et al. Report on United States Air Force Expeditionary Forces, Volume 1, SAB-TR-97-01, AF/SB Pentagon, Washington DC. November 1997

Fuch R., et al. Report on United States Air Force Expeditionary Forces, Volume 2, SAB-TR-97-01, AF/SB Pentagon, Washington DC. February 1998

Graziano, Anthony M., Raulin, Michael L. Research Methods, A Process of Inquiry (4<sup>th</sup> Editon). Needham Heights: Educational Publishers Inc.

Hosek, Jame R. How Deployments Affect Service Members, Rand Corporation. Santa Monica CA. 2003

HQ AETC, Education and Training Course Website,  
([https://etca.randolph.af.mil/showcourse.asp?as\\_course\\_id=E3OAR33S4%20%200A2B](https://etca.randolph.af.mil/showcourse.asp?as_course_id=E3OAR33S4%20%200A2B)) (Accessed 21 January 2007)

HQ AFPC/DP APDT. Air Force Officer Demographics Report, January 2007. (accessed 12 Feb 07)

Khalilzad, Zalmay. Sources of Conflict for the 21<sup>st</sup> Century, Rand Corporation, Santa Monica CA, 2003

Leedy, Paul D., Ormrod, Jeanne E.(2005) Practical Research Planning and Design (8<sup>th</sup> Edition). Upper Saddle River: Prentice Hall

Littlte, Rex W. An Analysis of Training Adequacy and Additional Training Requirements as Perceived By Communications and Information Officers, MS Thesis, AFIT/GIR/LAS/99D-7. School of Engineering and Management, Air Force Institute of Technology (AU), Wright Patterson AFB OH, December 1999

McClave, James T. et al. Statistics for Business and Economics (9<sup>th</sup> Edition). Upper Saddle River: Prentice Hall

Moschgat, James E. The Composite Wing, Back to the Future, School For Advanced Air Power Studies (AU), Maxwell AFB AL, 1993

Nelson, Jeff CMSgt, Enlisted Force Development Brief, SAF/ID, September 2006

Nowak, Michael J. A Strategy for an Uncertain Future. MS Thesis, AU/AWC/178-1999-04. Air War College (AU), Maxwell AFB AL, April 1999.

Phillips Susan E. An Analysis of the Importance of Critical Skills as Perceived by Air Force Communications and Information Commanders, MS Thesis, AFIT/GIR/LAS/98S-11. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright Patterson AFB OH, September 1998

Schloss, Patrick J., Smith, Maureen A. (1999) Conducting Research. Upper Saddle River: Prentice Hall

Schmidt, Donald A. An Analysis of the Critical Skills, Training Sources, and Traiing Adequacy as Perceived by Air Force Communications and Informations Officer. MS Thesis, AFIT/GIR/LAS/98S-11. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1997

Thomas, R. M. Qualitative and Quantitative Research Methods in Theses and Dissertations. Thousand Oaks: Corwin Press Inc. Tinsley, Peter G. Grand Strategy for the United States in the 21<sup>st</sup> Century, U.S. Army War College, Carlisle Barracks, Carlisle PA, 18 March 2005

Tirpak, John A. *The Expeditionary Air Force Takes Shape*, Air Force Magazine, June 1997, Vol. 80, No. 6 (accessed online 10 December 2006)

Travnick, William R. Making the Expeditionary Aerospace Force Work – Now, The Institute of National Security Studies (AU), USAF Academy CO. April 2000

USAF Fact Sheet, Air and Space Force Expeditionary Center, November 2006

USAF Transformation Flight Plan, HQ USAF, 2004

Woolf, Amy F. U.S. Nuclear Weapons: A Change in Force Structure. Congressional Research Service, Washington DC. 10 August 2006

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<b>14. ABSTRACT</b> <p>Military operations in the past, present, and future are highly dependent on the timely distribution of accurate information; the only thing really changing is the speed and means of which it is dispersed. As we proceed forward in the information age, technology and the men and women responsible for it will play an ever increasing role in getting the right information in the right place at the right time. As the United States Air Force continues to transform into an ever increasing expeditionary service the knowledge, skills, and abilities of Air Force officers must transform as well to meet the evolving needs of combatant commanders. 33Sx officers perform garrison duties in many different capacities; current duty position or past experience thus does not guarantee we have acquired the knowledge, skills and abilities necessary to succeed when and where it matters most. Hence, the purpose of this research is to identify core skill sets in the form of knowledge, skills, and abilities, which are most important to Communication and Information (AFSC 33Sx) Officers to successfully carry out assigned duties in forward operating locations.</p>				
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